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REPORT OF THE SECRETARY
OF THE SMITHSONIAN
INSTITUTION

1930

SMITHSONIAN INSTITUTION
WASHINGTON
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EARL S. JOHNSTON

REPORT OF THE SECRETARY
OF THE SMITHSONIAN
INSTITUTION

FOR THE YEAR ENDING JUNE 30

1930



(Publication 3073)

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930

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¹ In part governmentally supported.

THE SMITHSONIAN INSTITUTION

June 30, 1930

Presiding officer ex officio.—HERBERT HOOVER, President of the United States.
Chancellor.—CHARLES EVANS HUGHES, Chief Justice of the United States.

Members of the Institution:

HERBERT HOOVER, President of the United States.
CHARLES CURTIS, Vice President of the United States.
CHARLES EVANS HUGHES, Chief Justice of the United States.
HENRY L. STIMSON, Secretary of State.
ANDREW W. MELLON, Secretary of the Treasury.
PATRICK J. HURLEY, Secretary of War.
WILLIAM D. MITCHELL, Attorney General.
WALTER F. BROWN, Postmaster General.
CHARLES FRANCIS ADAMS, Secretary of the Navy.
RAY LYMAN WILBUR, Secretary of the Interior.
ARTHUR M. HYDE, Secretary of Agriculture.
ROBERT P. LAMONT, Secretary of Commerce.
JAMES JOHN DAVIS, Secretary of Labor.

Regents of the Institution:

CHARLES EVANS HUGHES, Chief Justice of the United States, Chancellor.
CHARLES CURTIS, Vice President of the United States.
REED SMOOT, Member of the Senate.
JOSEPH T. ROBINSON, Member of the Senate.
CLAUDE A. SWANSON, Member of the Senate.
ALBERT JOHNSON, Member of the House of Representatives.
R. WALTON MOORE, Member of the House of Representatives.
ROBERT LUCE, Member of the House of Representatives.
ROBERT S. BROOKINGS, citizen of Missouri.
IRWIN B. LAUGHLIN, citizen of Pennsylvania.
FREDERIC A. DELANO, citizen of Washington, D. C.
DWIGHT W. MORROW, citizen of New Jersey.
JOHN C. MERRIAM, citizen of Washington, D. C.

Executive committee.—FREDERIC A. DELANO, R. WALTON MOORE, JOHN C. MERRIAM.

Secretary.—CHARLES G. ABBOT.

Assistant Secretary.—ALEXANDER WETMORE.

Chief Clerk and administrative assistant to the Secretary.—HARRY W. DORSEY.

Treasurer and disbursing agent.—NICHOLAS W. DORSEY.

Editor.—WEBSTER P. TRUE.

Librarian.—WILLIAM L. CORBIN.

Appointment clerk.—JAMES G. TRAYLOR.

Property clerk.—JAMES H. HILL.

NATIONAL MUSEUM

Assistant Secretary (in charge).—ALEXANDER WETMORE.

Administrative assistant to the Secretary.—WILLIAM DE C. RAVENEL.

Head curators.—WALTER HOUGH, LEONHARD STEJNEGER, RAY S. BASSLER.

Curators.—PAUL BARTSCH, RAY S. BASSLER, THEODORE T. BELOTE, AUSTIN H. CLARK, FRANK W. CLARKE, FREDERICK V. COVILLE, W. F. FOSHAG, HERBERT FRIEDMANN, CHARLES W. GILMORE, WALTER HOUGH, LELAND O. HOWARD, ALEŠ HRDLÍČKA, NEIL M. JUDD, HERBERT W. KRIEGER, FREDERICK L. LEWTON, GERRIT S. MILLER, JR., CARL W. MITMAN, CHARLES E. RESSER, WALDO L. SCHMITT, LEONHARD STEJNEGER.

Associate curators.—JOHN M. ALDRICH, CHESTER G. GILBERT, ELLSWORTH P. KILLIP, WILLIAM R. MAXON, CHARLES W. RICHMOND, DAVID WHITE.

Chief of correspondence and documents.—HERBERT S. BRYANT.

Disbursing agent.—NICHOLAS W. DORSEY.

Superintendent of buildings and labor.—JAMES S. GOLDSMITH.

Editor.—MARCUS BENJAMIN.

Assistant Librarian.—LEILA G. FORBES.

Photographer.—ARTHUR J. OLMSTED.

Property clerk.—WILLIAM A. KNOWLES.

Engineer.—CLAYTON R. DENMARK.

NATIONAL GALLERY OF ART

Director.—WILLIAM H. HOLMES.

FREER GALLERY OF ART

Curator.—JOHN ELLERTON LODGE.

Associate curator.—CARL WHITING BISHOP.

Assistant curator.—GRACE DUNHAM GUEST.

Associate.—KATHARINE NASH RHOADES.

Superintendent.—JOHN BUNDY.

BUREAU OF AMERICAN ETHNOLOGY

Chief.—MATTHEW W. STIRLING.

Ethnologists.—JOHN P. HARRINGTON, JOHN N. B. HEWITT, TRUMAN MICHELSON, JOHN R. SWANTON.

Archeologist.—FRANK H. H. ROBERTS, JR.

Editor.—STANLEY SEARLES.

Librarian.—ELLA LEARY.

Illustrator.—DE LANCEY GILL.

INTERNATIONAL EXCHANGES

Secretary (in charge).—CHARLES G. ABBOT.

Chief clerk.—COATES W. SHOEMAKER.

NATIONAL ZOOLOGICAL PARK

Director.—WILLIAM M. MANN.

Assistant director.—ERNEST P. WALKER.

ASTROPHYSICAL OBSERVATORY

Director.—CHARLES G. ABBOT.

Assistant director.—LOYAL B. ALDRICH.

Research assistant.—FREDERICK E. FOWLE, JR.

Associate research assistant.—WILLIAM H. HOOVER.

DIVISION OF RADIATION AND ORGANISMS

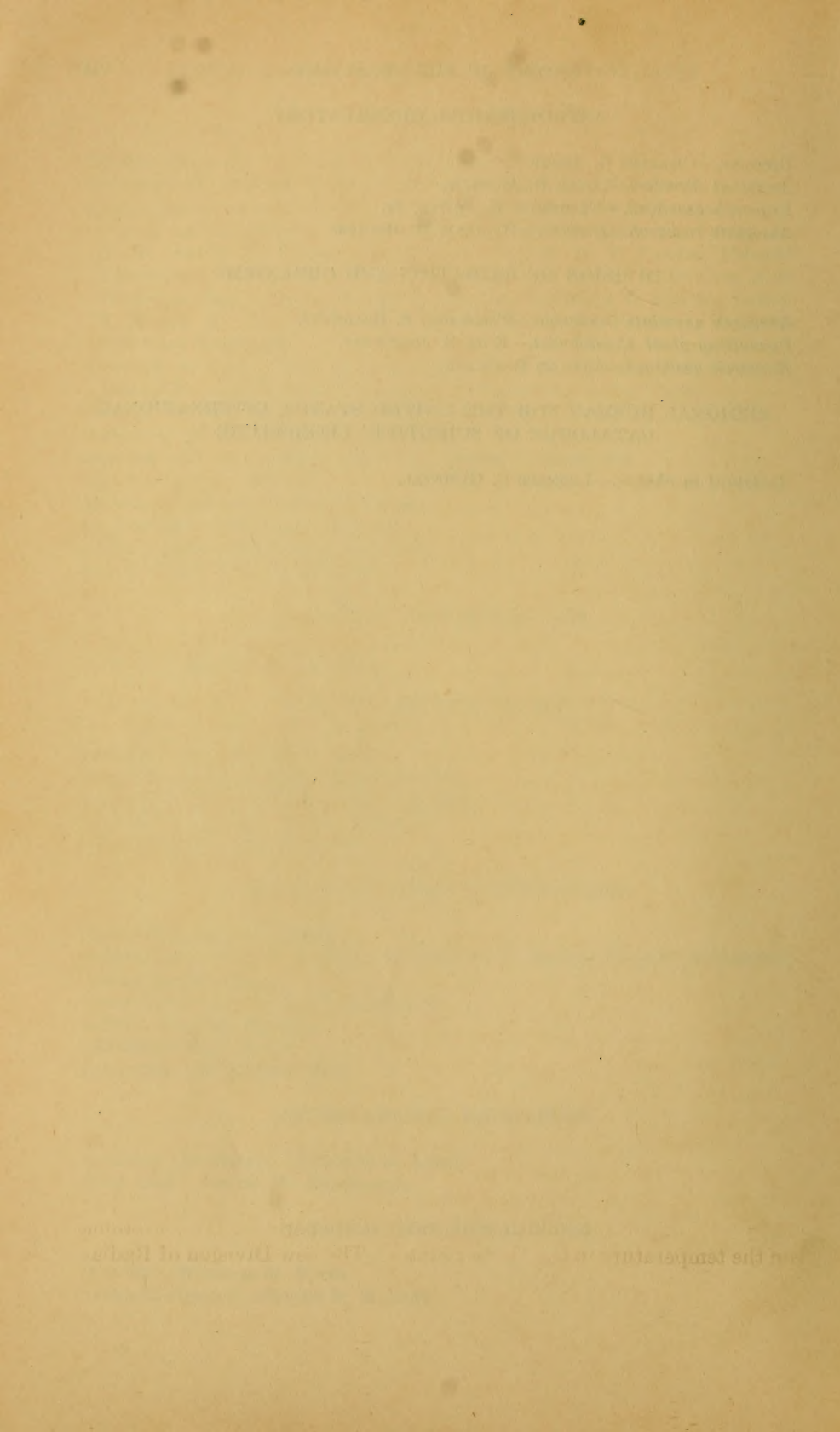
Research associate in charge.—FREDERICK S. BRACKETT.

Consulting plant physiologist.—EARL S. JOHNSTON.

Research assistant.—LELAND B. CLARK.

REGIONAL BUREAU FOR THE UNITED STATES, INTERNATIONAL
CATALOGUE OF SCIENTIFIC LITERATURE

Assistant in charge.—LEONARD C. GUNNELL.



REPORT
OF THE
SECRETARY OF THE SMITHSONIAN
INSTITUTION

C. G. ABBOT

FOR THE YEAR ENDING JUNE 30, 1930

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: I have the honor to submit herewith my report showing the activities and condition of the Smithsonian Institution and the Government bureaus under its administrative charge during the fiscal year ended June 30, 1930. The first 24 pages contain a summary account of the affairs of the Institution. Appendixes 1 to 11 give more detailed reports of the operations of the United States National Museum, the National Gallery of Art, the Freer Gallery of Art, the Bureau of American Ethnology, the International Exchanges, the National Zoological Park, the Astrophysical Observatory, the Division of Radiation and Organisms, the United States Regional Bureau of the International Catalogue of Scientific Literature, the Smithsonian library, and of the publications issued under the direction of the Institution; and Appendix 12 contains a list of subscribers since November 15, 1929, to the James Smithson Memorial Edition of the Smithsonian Scientific Series.

THE SMITHSONIAN INSTITUTION

OUTSTANDING EVENTS OF THE YEAR

Several events of unusual importance to the Institution have occurred during the year just passed, and its scientific work has progressed in a satisfactory manner. To mention some of the high-lights of the year's advance, Congress authorized an appropriation for the construction of the much-needed wings on the National History Building of the National Museum at a cost not to exceed \$6,500,000. The work of the Astrophysical Observatory has shown an apparently large and important influence of small short-period solar variations on the temperature in the United States. The new Division of Radia-

tion and Organisms has made rapid progress in the construction and equipment of laboratories for physical, chemical, and biological investigations, and has already obtained preliminary results in two highly interesting researches. Dr. R. H. Goddard, whose experiments in designing and building a rocket to explore the unknown upper layers of the atmosphere the Institution has aided for 12 years, brought the work to the point of practical demonstration. The late Simon Guggenheim, at Colonel Lindbergh's suggestion, has made a large grant to complete this development under most favorable auspices. Dr. C. U. Clark, under a grant from Ambassador Charles G. Dawes, has made important discoveries of unpublished early Spanish-American records in European archives. Four more volumes of the Smithsonian Scientific Series were practically ready to be issued at the close of the year, making eight volumes completed, and the last four are well advanced in preparation. Substantial sums have already been received by the institution as royalties on the sale of this series. The fifth and sixth awards of the Langley Gold Medal for Aerodromics were made to Charles Matthews Manly and Commander (now Admiral) Richard Evelyn Byrd. Under the auspices of the Institution and its branches many expeditions went into the field to obtain necessary data and collections. Reference to these will be found in the following reports. Many monographs and smaller papers embodying the results of original researches have been published and widely distributed throughout the world.

THE ESTABLISHMENT

The Smithsonian Institution was created by act of Congress in 1846, according to the terms of the will of James Smithson, of England, who, in 1826, bequeathed his property to the United States of America "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." In receiving the property and accepting the trust, Congress determined that the Federal Government was without authority to administer the trust directly, and therefore constituted an "establishment" whose statutory members are "the President, the Vice President, the Chief Justice, and the heads of the executive departments."

THE BOARD OF REGENTS

The affairs of the Institution are administered by a Board of Regents whose membership consists of "the Vice President, the Chief Justice, three members of the Senate, and three Members of

the House of Representatives, together with six other persons other than Members of Congress, two of whom shall be resident in the city of Washington and the other four shall be inhabitants of some State, but no two of them the same State." One of the Regents is elected chancellor by the board; in the past the selection has fallen upon the Vice President or the Chief Justice; and a suitable person is chosen by the Regents as Secretary of the Institution, who is also secretary of the Board of Regents, and the executive officer directly in charge of the Institution's activities.

The only change occurring in the personnel of the board during the year was the resignation of Chief Justice Taft and his succession by Charles Evans Hughes, both as Chief Justice and as Chancellor of the Board of Regents.

The roll of the Regents at the close of the fiscal year was as follows: Charles Evans Hughes, Chief Justice of the United States, chancellor; Charles Curtis, Vice President of the United States; members from the Senate, Reed Smoot, Joseph T. Robinson, Claude A. Swanson; members from the House of Representatives, Albert Johnson, R. Walton Moore, Robert Luce; citizen members, Robert S. Brookings, Missouri; Irwin B. Laughlin, Pennsylvania; Frederic A. Delano, Washington, D. C.; Dwight W. Morrow, New Jersey; and John C. Merriam, Washington, D. C.

FINANCES

The permanent investments of the Institution consist of the following:

Total endowment for general or specific purposes (exclusive of Freer funds).....	\$1, 670, 582. 40
Itemized as follows:	
Deposited in the Treasury of the United States, as provided by law.....	1, 000, 000. 00
Deposited in the consolidated fund:	
Miscellaneous securities, etc., either purchased or acquired by gift; cost or value at date acquired.....	578, 292. 40
Springer, Frank, fund for researches, etc. (bonds).....	30, 000. 00
Walcott, Charles D. and Mary Vaux, fund for researches, etc. (stocks and bonds).....	12, 477. 50
Younger, Helen Walcott, fund (real estate notes and stock, held in trust).....	49, 812. 50
Total.....	1, 670, 582. 40

The above mentioned funds of the Institution are described as follows:

Fund	United States Treasury	Consolidated fund	Separate funds	Total
Bacon, Virginia Purdy, fund.....		\$65,812.09		\$65,812.09
Baird, Lucy H., fund.....		2,076.68		2,076.68
Canfield Collection, fund.....		50,242.50		50,242.50
Casey, Thomas L., fund.....		6,416.97		6,416.97
Chamberlain fund.....		36,990.04		36,990.04
Hodgkins (specific), fund.....	\$100,000.00			100,000.00
Hughes, Bruce, fund.....		17,942.72		17,942.72
Myer, Catherine W., fund.....		21,700.97		21,700.97
Pell, Cornelia Livingston, fund.....		3,171.41		3,171.41
Poore, Lucy T. and Geo. W., fund.....	26,670.00	31,478.61		58,148.61
Reid, Addison T., fund.....	11,000.00	12,476.50		23,476.50
Roebling fund.....		158,524.06		158,524.06
Smithsonian unrestricted fund:				
Avery fund.....	14,000.00	48,914.74		62,914.74
Endowment fund.....		72,353.49		72,353.49
Habel fund.....	500.00			500.00
Hachenberg fund.....		5,285.01		5,285.01
Hamilton fund.....	2,500.00	529.41		3,029.41
Henry fund.....		1,588.62		1,588.62
Hodgkins general fund.....	116,000.00	39,394.24		155,394.24
Parent fund.....	727,640.00	1,603.49		729,243.49
Rhees fund.....	590.00	621.33		1,211.33
Sanford fund.....	1,100.00	1,169.52		2,269.52
Springer, Frank, fund.....			\$30,000.00	30,000.00
Walcott, Charles D. and Mary Vaux, fund.....			12,477.50	12,477.50
Younger, Helen Walcott, fund.....			49,812.50	49,812.50
Total.....	1,000,000.00	578,292.40	92,290.00	1,670,582.40

The Institution gratefully acknowledges gifts from the following donors:

Dr. W. L. Abbott, for archeological expedition to Hispaniola and other places.

Mrs. Laura Welsh Casey, for further contributions to the Thomas Lincoln Casey fund for researches in Coleoptera.

Mr. Childs Frick, for researches in vertebrate paleontology.

Harvard University, for contribution toward purchase of meteorite.

Missouri Historical Society, for further study of the language of the Osage Indians.

National Academy of Sciences (through Dr. Hrdlička), for archeological explorations in Alaska.

Research Corporation, for further contributions for research in radiation.

Mr. John A. Roebling, for further contributions for researches in radiation and studies in world weather records.

Dr. William Schaus, for purchase of specimens of Lepidoptera.

Mrs. Mary R. Swales, for expenses of publications in connection with Swales fund.

Mr. Hans Wilkens, of Reading, Pa., for general endowment fund of the Institution.

Freer Gallery of Art.—The invested funds of the Freer bequest are classified as follows:

Court and grounds fund.....	\$592,046.60
Court and grounds maintenance fund.....	149,608.46
Curator fund.....	602,395.38
Residuary legacy.....	3,956,879.06
Total.....	5,300,929.50

The practice of depositing on time in local trust companies and banks such revenues as may be spared temporarily has been continued during the past year, and interest on these deposits has amounted to \$8,103.31.

*Cash balances, receipts and disbursements during the fiscal year*¹

Cash balance on hand June 30, 1929.....		\$216, 994. 28
Receipts:		
Cash from invested endowments and from miscellaneous sources for general use of the Institution.....	\$74, 850. 62	
Cash for increase of endowments for specific use.....	1, 029. 57	
Cash gifts for increase of endowments for general use.....	189. 10	
Cash gifts, etc., for specific use (not to be invested).....	105, 710. 88	
Cash received as royalties from sales of Smithsonian Scientific Series ²	21, 833. 92	
Cash gain from sale, etc., of securities (to be invested).....	2, 170. 13	
Cash income from endowments for specific use other than Freer endowment, and from miscellaneous sources.....	72, 078. 30	
Cash capital from sale, call of securities, etc. (to be reinvested).....	175, 357. 85	
Total receipts other than Freer endowment.....		453, 220. 37
Cash receipts from Freer endowment—income from investments.....	\$303, 780. 87	
Net gain from sale, etc., of securities (to be invested).....	38, 480. 34	
Cash capital from sale, call of securities, etc. (to be reinvested).....	1, 432, 644. 95	
Total.....		1, 774, 906. 16
Total.....		2, 445, 120. 81
Disbursements:		
From funds for general work of the Institution—		
Buildings, care, repairs and alteration....	1, 937. 05	
Furniture and fixtures.....	529. 17	
General administration ³	24, 154. 26	
Library.....	3, 170. 37	
Publications (comprising preparation, printing and distribution).....	13, 224. 93	

¹ This statement does not include Government appropriations under the administrative charge of the Institution.

² Under resolution of the Board of Regents three-fourths of this income is credited to the permanent endowment fund of the Institution and one-fourth is made expendable for general purposes.

³ This includes salaries of the secretary and certain others.

Disbursements—Continued.

From funds for general work of the Institution—Continued.

Researches and explorations.....	\$19,294.39
International exchanges.....	4,830.35

\$67,140.52

From funds for specific use other than Freer endowment:

Investments made from gifts, from gain, from sales, etc., of securities and from saving on income.....	20,659.95
--	-----------

Other expenditures, consisting largely of research work, travel, increase and care of special collections, etc., from income of endowment funds and cash gifts for specific use.....	147,063.31
--	------------

Cash capital from sale, call of securities, etc., reinvested.....	174,900.30
---	------------

342,623.56

From Freer endowment:

Operating expenses of gallery, salaries, purchases of art objects, field expenses, etc.....	337,207.13
---	------------

Investments made from gain from sale, etc., of securities and from income.....	50,045.48
--	-----------

Cash capital from sale, call of securities, etc., reinvested.....	1,433,233.95
---	--------------

1,820,486.56Balance June 30, 1930..... 214,870.17Total..... 2,445,120.81*Recapitulation of receipts, exclusive of Freer funds, during the year ending June 30, 1930*

General uses:

For addition to endowment.....	\$16,564.55
Reserved as income.....	80,309.09

\$96,873.64

Specific uses:

Gifts accretions to endowment.....	1,000.00
------------------------------------	----------

Gifts for specific use not to be invested.....	105,710.88
--	------------

Cash income from endowments for addition to endowment.....	6,961.38
--	----------

Cash income from endowments and from other sources for conducting researches, explorations, etc.....	67,316.62
--	-----------

Cash capital from sale, call of securities, etc. (to be reinvested).....	175,357.85
--	------------

356,346.73Total receipts exclusive of Freer funds..... 453,220.37

Statement of endowment funds

	General purposes	Specific purposes other than Freer endowment	Freer endowment
Endowment, June 30, 1929.....	\$1,022,385.75	\$626,003.70	\$5,236,054.02
Increase from income, gifts, etc.....	1,418.00	8,825.19	11,602.60
Increase from gain from sales, etc.....	9,531.19	885.57	38,442.88
Increase from stock dividends.....	454.91	1,078.09	14,830.00
Endowment June 30, 1930.....	1,033,789.85	636,792.55	5,300,929.50

The following appropriations were made by Congress for the Government bureaus under the administrative charge of the Smithsonian Institution for the fiscal year 1930:

Salaries and expenses.....		\$36,004.00
Gellatly Art Collection.....		21,000.00
International Exchanges.....		51,297.00
American Ethnology.....		68,800.00
International Catalogue of Scientific Literature.....		7,885.00
Astrophysical Observatory.....		36,720.00
National Museum:		
Furniture and fixtures.....	\$33,240.00	
Heating and lighting.....	90,160.00	
Preservation of collections.....	570,084.00	
Building repairs.....	21,080.00	
Books.....	2,000.00	
Postage.....	450.00	
		717,014.00
National Gallery of Art.....		34,853.00
National Zoological Park.....		203,000.00
National Zoological Park, building for reptiles.....		220,000.00
National Zoological Park, gates for south boundary.....		2,000.00
Printing and binding.....		95,000.00
Total.....		1,493,573.00

MATTERS OF GENERAL INTEREST

AWARD OF LANGLEY MEDAL TO CHARLES MATTHEWS MANLY AND TO
COMMANDER RICHARD EVELYN BYRD, UNITED STATES NAVY

The fifth and sixth awards of the Langley Gold Medal for Aerodromics to Charles Matthews Manly (posthumously) and to Commander (now Admiral) Richard Evelyn Byrd, United States Navy, were made at the Annual Meeting of the Board of Regents of the Institution on December 12, 1929. The medal had been hitherto awarded four times, to Wilbur and Orville Wright, to Glenn H. Curtiss, to Gustave Eiffel, and to Charles A. Lindbergh. The award

to Mr. Manly was made in recognition of his pioneer contributions to the development of the airplane engine, and that to Commander Byrd for his pioneer flights over the North and South Poles, his non-stop flight over the Atlantic Ocean, and the scientific discoveries associated with these flights.

The posthumous award to Mr. Manly will be presented through the person of his son. Commander Byrd was notified of the award to him by radiogram to Little America, Antarctica. The actual presentation of the two gold medals had not been made at the close of the year.

ADDITIONS TO THE NATURAL HISTORY BUILDING OF THE NATIONAL MUSEUM

An event of capital importance to the future of the Smithsonian and the National Museum occurred on June 19, 1930, when Congress passed the following bill:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Smithsonian Institution is hereby authorized to extend the Natural History Building of the United States National Museum by additions on the east and west ends thereof, in accordance with plans to be approved by the Commission of Fine Arts, and to engage, if necessary, architectural and inspection services, without regard to the restrictions of existing law governing such services. There is hereby authorized to be appropriated a sum not exceeding \$6,500,000 for this purpose.

The present Natural History Building has for years been overcrowded, both as to exhibition halls and to laboratories and storage rooms. The additions authorized by Congress, which will approximately double the present floor space, will not only permit of a more satisfactory arrangement of exhibits for the benefit of the more than one million visitors every year, but also will provide additional facilities for the growing research work of the Museum staff.

The bill quoted above is only an authorization and does not carry an actual appropriation. Plans have not yet been prepared, but in general the additions will conform in style and general arrangement with the present structure.

RESEARCHES IN EUROPEAN ARCHIVES

Early in 1929 Ambassador Charles G. Dawes provided the Institution with a fund for the purpose of conducting researches among European archives in search of documents relating to the early history and ethnology of middle America. In April, 1929, Dr. C. U. Clark was appointed by the Smithsonian to conduct this mission, and early in October Doctor Clark began his work in Europe. Since that

time he has studied diligently at several of the principal archives containing early American material and has discovered a considerable number of valuable early manuscripts hitherto unpublished. In addition to the titles listed below Doctor Clark has excerpted many hundreds of pages of interesting ethnological material relating to the Americas from manuscripts which were not of special interest in their complete form, such as reports, letters, etc. The manuscripts copied and prepared for publication are as follows:

Vatican Library.—Reginus Lat. 1608. Contains four leaves containing a Nahuatl vocabulary and Nahuatl sentences for priests learning the language. Twelve typewritten pages.

Vatican Library.—Codex Barberini. Latinus 241. Written in Latin 1552 by Indian trained by Franciscans. Illustrated by 185 aquarelles in color representing plants and flowers. Sixty-three folios 6 by 8¼.

Saville, Archivos Nacional.—Guatemala No. 45. Maya-Aztec manuscript, being the village record book of San Juan Amatitlan, Guatemala 1559-1562. Written partially in the Pokoman dialect of Maya. Over 300 entries in Maya, in addition to a quantity of Aztec material.

Archivos Nacional.—Saville, Guatemala 128. Account of the official assessment of 1548-1550 for the Indian Pueblos of Guatemala, Nicaragua, Yucatan, and Comayagua. This gives an accurate census of Yucatan. Four hundred folios; 54 typewritten pages. Indian census of 1549. Made under direction of Diaz de Castillo.

Biblioteca de Catalunya, Barcelona.—Vocabulary of Tahitian language, 1774. Eight and one-half pages of two columns; 80 words to a page. Three and one-half pages of information derived from the Tahitians. Three pages of a list of 100 questions to be put to natives.

Vatican Library.—Barberini Lat. 3584. "Compendos y Descripcion de la Indias Ocodentales." Fray Antonio Vazquez de Espinosa, 1629. A voluminous compendium of information concerning the natives of South America, Central America, and the West Indies. Regarded by experts as of extraordinary value.

Madrid. Biblioteca Nacional 19267.—"Anlagoya's letter from Cali," 1540. Forty-three typewritten pages. An official description of the native tribes of Colombia.

ROCKET EXPERIMENTS OF DR. R. H. GODDARD

For the past 12 years the Institution has supported by annual grants the researches of Dr. R. H. Goddard, of Clark University, on the development of a rocket to explore the upper atmosphere. In 1916 Doctor Goddard presented to the Institution such a convincing mathematical demonstration of the theory that a self-propelling rocket could be sent to the limit of the earth's atmosphere, and even beyond, that Doctor Walcott, then Secretary of the Smithsonian, after consultation with a committee of experts, agreed to support the investigation. The work progressed so favorably that the Institution has continued its support until the present time.

The highest level of the air which can now be studied is about 20 miles up, reached by sounding balloons, but these balloons often drift as much as 150 miles from their starting point, and their recovery is slow and uncertain. A rocket, on the other hand, would go straight up to any desired height and provided with a parachute would return in a short time at or very near its starting point. With suitable automatic apparatus, such a rocket could bring back samples of the upper air for chemical analysis, measure the temperature and pressure of the higher atmosphere, expose spectographs above the ozone layer where the ultra-violet spectrum of the sun could be observed, and record the condition of the atmosphere from 5,000 feet upward in the interests of aviation. In short, a whole new field of investigation would be opened up—the unknown upper layers of the earth's atmosphere.

This investigation was pioneering in character; little was available as a guide. After much experimenting with a rocket equipped with a device for feeding small charges of high explosive, Doctor Goddard turned finally to the scheme of a steady combustion of hydrocarbon in liquid oxygen. After further modifying the design of the rocket itself to adapt it to the use of this new means of propulsion, Doctor Goddard was ready at the close of the fiscal year for an actual field trial of the device.

It may be said that on July 17, 1929, a trial of the liquid-propelled rocket was made at Worcester, Mass., the device functioning satisfactorily as regards the flow of liquid, the ascent of the rocket, and its rapid motion in air. The trial rocket was guided only by vanes on its rear end, and these proved inefficient, the rocket describing a high arch and returning to the ground instead of making a vertical flight. Doctor Goddard has already designed automatic stabilizers, however, and these together with the necessary automatic recording devices are seemingly all that is needed to insure a successful, practical flight of the rocket to the higher layers of the atmosphere and its return with the first records of an unknown region.

The apparently assured success of Doctor Goddard's experiments has drawn support from a source better equipped financially to provide it than the Smithsonian. The late Simon Guggenheim at Colonel Lindbergh's suggestion made a large grant of funds and set up an advisory committee of which the secretary, Doctor Abbot, is a member. Doctor Goddard's experiments are now going on under these auspices in New Mexico. It is a pleasure to record here that the Smithsonian has again been able to support during its more or less uncertain pioneering stages an investigation of great promise for the increase of knowledge.

LOW TEMPERATURE RESEARCHES

The Smithsonian has made two small grants during the year to Prof. Dr. W. H. Keesom, director of the Cryogenic Laboratory at Leiden, in aid of his important researches on the properties of matter at very low temperatures. Two investigations were in progress by Doctor Keesom, with the aid of his collaborators, namely, the measurement of the specific heat of gases at very low temperatures, and the measurement of the thermomolecular pressure differences at very low temperatures.

In connection with the first, it seemed desirable to obtain measurements on the specific heat of helium gas at the temperatures obtainable with liquid helium. Such a measurement had already been made by Meissner in Berlin, who found the specific heat of helium gas at a temperature of 5.5° K. (approximately -450° F.) and a pressure of 0.75 atmosphere to be about 65 per cent of the normal value, and ascribed this result to quantum effects. There is reason to doubt, however, whether quantum effects can be demonstrated in such a way because of the influence of intermolecular forces on specific heat. To investigate this matter, Doctor Keesom and his assistants elaborated a method of measuring the velocity of propagation of sound at these very low temperatures and at pressures smaller than 1 atmosphere. From this velocity, the specific heat may be derived.

Measurements of this velocity have already been made with great accuracy at the temperatures of liquid oxygen and of liquid hydrogen, and preliminary measurements have been made of the velocity of sound in helium gas at the temperature of liquid helium, but further developments in the method must be made for this last investigation.

Doctor Keesom's second research relates to the investigation of the thermomolecular pressure differences between the bulb of the helium thermometer and the manometer used in the measurement of the lowest temperatures obtainable. In his latest measurements the temperature recorded was 0.89° K. (approximately, $=458^{\circ}$ F.). Exact measurements of these pressure differences have now been made at the temperatures of boiling oxygen and of boiling hydrogen; measurements at the temperatures obtainable with liquid helium will follow.

DIVISION OF RADIATION AND ORGANISMS

The report of the director on the first year's work of this new and important branch of the Smithsonian's investigations in physical science shows remarkably rapid progress. The construction of laboratories and their equipment has been particularly difficult because

of the borderline character of the researches; it was necessary to provide for physical, chemical, and biological fields of investigation. In spite of the constant construction and equipment problems, actual research work was started, and two experiments, the one on phototropism, the other on infra-red absorption of pure chemicals, were carried to interesting preliminary results.

Offices for the division were provided by remodelling the hitherto unused flag tower of the Smithsonian Building, and space in the basement previously used for storage was reconstructed into a modern physical, chemical, and biological laboratory. A small group of highly trained specialists has been assembled to carry on the investigations, and these men work in close cooperation with the Smithsonian Astrophysical Observatory, the Fixed Nitrogen Laboratory of the Agricultural Department, the University of Maryland, and the Research Corporation of New York.

The chief aim of the division is to build up a strong spectrophotometric laboratory, whose staff of physicists and technicians will work in cooperation with men of biological training. The researches to be undertaken fall into two classes: (1) Direct investigation upon living organisms, and (2) fundamental molecular structure and photochemical investigations related to the biological problems. In connection with the first, an experiment was made to determine the amount of bending of plants towards light of various wave lengths. Briefly, the experiment showed that red or infra-red light produced no effect; that yellow light produced a small but measurable bending; that green light was 1,000 times more effective than yellow; and that blue light was 30 times more effective than green, or 30,000 times more effective than yellow. These results are so interesting that preparations are under way for a more elaborate experiment.

Under the second heading above, no work could be undertaken at the Smithsonian because of lack of funds and shop equipment. Some progress was made, however, in the preparation of equipment, and through the cooperation of the Fixed Nitrogen Laboratory, Mr. Liddell of its staff continued an investigation begun there by Doctor Brackett before his appointment by the Smithsonian. This project, which was completed as far as the equipment permitted, involved the study of the near infra-red absorption spectra of the halogen deviations of benzene.

EXPLORATIONS AND FIELD WORK

Expeditions in the field are essential to the Smithsonian's work in anthropology, biology, geology, and astrophysics. Twenty-eight major expeditions went out during the year to widely scattered regions, bringing back necessary information and valuable speci-

mens. The Institution bore the entire expense of a few of these expeditions. For the cost of the others, in part at least, it is indebted to friends of the Smithsonian or to other institutions equally interested in the proposed work.

The regions visited by the year's field expeditions included China, Alaska, Canada, the West Indies, South America, Africa, Europe, the Philippines, and Siam, as well as 13 localities in the United States. I may mention especially Assistant Secretary Dr. A. Wetmore's bird collecting expedition in Spain, Dr. Paul Bartsch's explorations for mollusks in the West Indies under the Walter Rathbone Bacon Travelling Scholarship; anthropological studies in Alaska by Dr. Aleš Hrdlička and Mr. Henry B. Collins, jr.; an extended botanical exploring trip in Amazonian Peru and Brazil, by Mr. Ellsworth P. Killip; and three separate expeditions to the island of Santo Domingo, namely, Mr. E. C. Leonard's botanical exploration of northwestern Haiti, Mr. Herbert W. Krieger's archeological work in the Dominican Republic, and Mr. Arthur J. Poole's explorations in Haitian caves.

Brief accounts of all of these expeditions, fully illustrated, appeared in "Explorations and Field-Work of the Smithsonian Institution in 1929," Smithsonian Publication No. 3060, and notices of some of them will be found in the reports of certain of the bureaus under the Institution's direction, appended hereto.

COOPERATIVE ETHNOLOGICAL AND ARCHEOLOGICAL INVESTIGATIONS

In 1928 Congress authorized the appropriation of \$20,000 for cooperative ethnological and archeological investigations in the several States. The Secretary of the Smithsonian Institution was designated to approve the investigations proposed, and if found desirable, to allot from the money appropriated a sum equal to that raised for the purpose by any State educational institution, or scientific organization in the United States. He was named also to direct the work and to divide the results thereof. Fifteen allotments for approved investigations have been made during the year, as follows:

Allotments from the fund for cooperative ethnological and archeological investigations during the fiscal year ended June 30, 1930

1929

Nov. 6. University of Nebraska, for an archeological survey of the Missouri, Platte, and Republican River Valleys in Nebraska, \$1,000.

1930

Jan. 17. University of Chicago, for continuation of an archeological survey of Illinois, \$1,000.

Mar. 17. Logan Museum, for archeological researches in Mandan villages, \$1,000.

Mar. 17. University of Kentucky, for archeological researches in eastern and western Kentucky, \$500.

- Mar. 21. University of California, for work among the Paviotso and Modoc in northeastern California, \$250.
- Mar. 21. University of California, for further work on Yokuts shamanism, \$150.
- Mar. 21. University of California, for a study of Yuki groups, \$150.
- Mar. 21. University of California, to continue and if possible complete work on northwestern California basketry, \$150.
- Mar. 21. University of California, for work on the Tolowa, a little known group of Athabascans in the extreme northwestern corner of California, \$125.
- Mar. 21. University of California, to continue work on the Northern Wintun, \$100.
- Mar. 21. San Diego Museum, for an archeological investigation of Los Angeles and Orange counties, \$800.
- Mar. 25. University of Illinois, for archeological investigation in the vicinity of Utica, Ill., \$1,000.
- April 4. University of Denver and Museum of Natural History of Denver, for an archeological survey of eastern Colorado, \$1,500.
- May 27. Phillips Academy, for an archeological survey of Merrimack Valley, \$1,000.
- June 13. Indiana Historical Bureau, to continue archeological survey of Indiana, \$1,000.

The above list, with that given in my last annual report, will serve to indicate the widespread interest aroused through this cooperative project for the study and preservation of the Indian material and data in the various States.

PUBLICATIONS

The publications of the Institution are issued in 11 distinct series, which total approximately 10,000 pages a year. The Institution proper publishes three of the series, namely, Smithsonian Annual Reports, Smithsonian Contributions to Knowledge, and Smithsonian Miscellaneous Collections; the other series are issued by the bureaus under Smithsonian direction. The Contributions to Knowledge, in quarto, which for many years was the best known of all of the series, has in recent years been suspended because the higher costs of printing made it impracticable to issue monographs in the more expensive quarto form. The Institution expects however to resume the Contributions when more resources become available.

A total of 95 volumes and pamphlets appeared during the year, and 168,163 copies of Smithsonian publications were distributed, including 19,575 volumes and separates of the Smithsonian Miscellaneous Collections, 29,886 volumes and separates of the Smithsonian Annual Reports, 4,598 Smithsonian special publications, 87,323 publications of the National Museum and 24,868 publications of the Bureau of American Ethnology. Titles and authors and other information regarding the year's publications are given in the report of the editor, appendix 11.

The Annual Report of the Board of Regents to Congress contained the usual General Appendix made up of articles in semipopular style to present the progress in nearly all branches of science during the year. These reports continue in wide demand, and many letters are received expressing appreciation of the Institution's efforts to give the nontechnical reader an authentic survey of the yearly advance along the scientific front.

SMITHSONIAN SCIENTIFIC SERIES

As stated in my last report, the Institution decided in 1928 to issue a popular, profusely illustrated series of 12 volumes relating to the several branches of science coming within the scope of its activities, with the expectation that through the sale of this series, increased resources might become available for the furtherance of its scientific work. The sale of the books, known as the Smithsonian Scientific Series, is entirely in the hands of the New York publishers, the Smithsonian's part being only that of author.

Volumes one to four appeared in 1929, as follows:

1. The Smithsonian Institution, by Webster Prentiss True.
2. The Sun and the Welfare of Man, by Charles Greeley Abbot.
3. Minerals from Earth and Sky. Part I, The Story of Meteorites, by George P. Merrill; Part II, Gems and Gem Minerals, by William F. Foshag.
4. The North American Indians. An account of the American Indians north of Mexico, compiled from the original sources, by Rose A. Palmer.

Volumes five to eight were still in press at the close of the fiscal year, but were expected to be received from the printer very soon thereafter. They are as follows:

5. Insects: Their Ways and Means of Living, by R. E. Snodgrass.
6. Wild Animals in and out of the Zoo, by William M. Mann.
7. Man from the Farthest Past, by C. W. Bishop, C. G. Abbot, and A. Hrdlička.
8. Cold-Blooded Vertebrates, by C. W. Gilmore, D. M. Cochran, and S. F. Hildebrand.

The remaining four volumes are in press or in an advanced state of preparation, and will be issued during the coming year.

LIBRARY

The Smithsonian library is composed of 10 divisional and 36 sectional libraries. The divisional libraries include the Smithsonian deposit in the Library of Congress, which is the Institution's main library, the office library, the Langley Aeronautical Library, and the seven libraries of the bureaus under administrative direction of the Institution, the largest of which is the National Museum library. This last includes the 36 sectional libraries, which are the working units kept in the various divisions of the Museum. The whole library numbers over 800,000 volumes, pamphlets, and charts. The year's accessions totaled 14,277 items, of which 7,979 were volumes and 6,298 were pamphlets and charts.

An important change during the year was the removal of the Langley Aeronautical Library from the Smithsonian Building to the Library of Congress, where although still remaining a unit of the Smithsonian library, it will be more centrally available to the student. Many gifts were received during the year, among which may be mentioned a collection of 1,400 volumes on various subjects from Mr. James Townsend Russell, jr.; 150 volumes and 1,000 periodicals chiefly on aeronautics from the National Aeronautic Association; and 58 volumes on Japanese history and literature from the Historical Institute, Tokyo.

Further progress was made on the union catalogue, but this large task will require many years for completion unless additional assistants are provided. The congested condition of the Museum library was relieved for the time being by the installation of 400 feet of new shelving.

The librarian notes that although two additional assistants are provided for in the coming year, six more are needed to enable the library to render the desired service to the work of the Institution.

GOVERNMENTALLY SUPPORTED BRANCHES

NATIONAL MUSEUM

The event of the year for the Museum was the passage of the Smoot-Elliott bill authorizing an appropriation for the extension of the Natural History Building by the construction of wings at the east and west ends at a cost of \$6,500,000. These additions, which will follow the style and general arrangement of the present building, will relieve the greatly overcrowded condition of the offices and exhibition halls, and also will permit of normal expansion of the national collections which are the foundation for researches in pure science and consequently for their application to the welfare of mankind.

The appropriations for the maintenance of the Museum for the year totaled \$762,514, an increase of \$14,490, of which \$9,500 provided for salaries of five additional positions, namely an assistant curator of mollusks, an additional clerk in the administrative office, and three sergeants of the watch. These additions to the personnel were of great benefit to the Museum's work, but several offices are still undermanned, both as to scientific and clerical workers.

Additions to the collections during the year totaled 410,815 specimens, the majority coming to the department of biology. Material sent in for expert examination and report numbered 1,306 lots, and gifts of duplicate material to schools totaled 11,474 specimens. Exchanges to the number of 12,649 specimens were sent out, and 33,208 were loaned to scientific workers outside of Washington.

Large collections of material representing the Indian and Eskimo tribes of Alaska came to the department of anthropology through the field work there by Dr. Aleš Hrdlička and Mr. Henry B. Collins, jr. There may also be mentioned an ethnological collection from Nigeria and the gold and ivory coasts of Africa, from Mr. C. C. Roberts; prayer stones and other objects of a religious nature from Tibet, presented by Mr. Charles S. Isham; and ethnological material from the Dominican Republic collected by Mr. H. W. Krieger.

Among the great amount of material received by the department of biology there stand out extensive collections given by the National Geographic Society, including birds and plants brought from western China by Dr. Joseph F. Rock and insects and plants from northern Brazil collected by Mr. E. G. Holt; further general natural history collections made in China by the Rev. D. C. Graham; biological material from Siam from Dr. Hugh M. Smith; and a very complete series of birds' eggs from Mr. A. C. Bent.

The most important single object received by the department of geology was the great flawless crystal ball $12\frac{7}{8}$ inches in diameter presented by Mrs. Worcester Reed Warner as a memorial to her husband. Through the income of the Roebing fund and of the Frances Lea Chamberlain fund, a considerable number of fine mineral specimens and gem stones were added to the collections. Through the field work of Resser, Gilmore, Gidley, and others of the Museum staff, large and valuable collections of fossils have been added.

Many interesting accessions came to the arts and industries department, prominent among them being the gift by Mr. Rudolph Eickemeyer of a large series of examples of his own work in pictorial photography, together with a library of works on photography. Mr. Eickemeyer has provided in his will a fund for the care of the collection. The division of history received among other historical material five pieces of china used in the White House by President James Madison, presented by Miss Mary M. McGuire, and a gown worn by Mrs. Calvin Coolidge presented for the costume collection by Mrs. Coolidge.

A large number of field expeditions went out under the direction of members of the Museum staff, financed chiefly by the private income of the Smithsonian Institution or through the aid of interested friends and patrons. These expeditions are described briefly in the report of the National Museum, Appendix 1.

The lecture rooms and auditorium of the Museum were used by Government and other agencies for hearings, meetings, and lectures to the number of 135. Visitors to the Museum totalled 1,894,989 for the year. Sixteen volumes and 35 pamphlets were published, and 87,323 copies of Museum publications were distributed.

NATIONAL GALLERY OF ART

The leading event of the year was the exhibition in the gallery of the 78 American paintings purchased during the last 10 years from the Ranger fund, which are subject to consideration as additions to the gallery's permanent collections as provided in the Ranger bequest. The paintings were lent for the exhibition by the institutions to which they were assigned by the National Academy of Design. The exhibition was opened on December 10, 1929, with a reception by the Secretary and Regents of the Institution, the Director of the National Gallery, and the members of the National Gallery of Art Commission; the National Academy of Design was represented by six of its officials.

Besides the exhibition of Ranger paintings, four special exhibits were held during the year, namely, sculpture of Edgardo Simone, portraits by Edwin B. Child, paintings, sculptures, etc., by contemporary Hungarian artists, and paintings by American Negro artists.

FREER GALLERY OF ART⁴

Additions to the collections by purchase during the year include examples of early Egyptian bookbinding; Chinese bronzes; Chinese jade objects; Persian and Egyptian manuscripts; Persian, Indian, Chinese, and Egyptian paintings; Chinese porcelain bowls; Chinese pottery; South Indian bronze sculpture; Chinese silver objects; and Chinese silver-gilt objects.

Curatorial work included the documentary study of inscriptions on new purchases as well as those on objects already in the collection. Expert opinion was given to other institutions and individuals regarding 834 objects and 185 photographs of objects sent in for examination. With the expert aid of Dr. A. K. Coomaraswamy, a large group of paintings in the Near Eastern section, purchased in 1907 from Col. H. B. Hanna, has undergone complete revision and reclassification.

The year's total attendance was 120,651; of these 1,349 visited the offices for general information or for study purposes. Sixteen groups were given docent service in the exhibition galleries, and 10 classes were given instruction in the study room. Two lectures were given in the auditorium: "The Caves of the Thousand Buddhas," by Sir Aurel Stein; and "Indian Sculpture: Intention and Development," by Dr. A. K. Coomaraswamy.

The field expedition was able, in spite of disturbed conditions, to make interesting investigations at the site of the Liang dynasty (A. D. 502-556) tombs, near Nanking, China.

⁴The Government's expense in connection with the Freer Gallery of Art consists mainly in the care of the building and certain other custodial matters. Other expenses are paid from the Freer endowment funds.

BUREAU OF AMERICAN ETHNOLOGY

The work of the bureau covered the usual wide range of ethnological and archeological investigations on many Indian tribes and sites of the United States. The chief, Mr. M. W. Stirling, made an archeological reconnaissance of the Ten Thousand Islands, Fla., and excavated mounds at Lacooche and at Safety Harbor, Fla. He delivered lectures before numerous scientific and educational bodies. Dr. John R. Swanton continued his field work on the Choctaw of Mississippi and the Creeks of Oklahoma, and began the work of translating the words of his Timucua dictionary. Dr. Truman Michelson studied the Algonquian tribes of Oklahoma, and Mr. John P. Harrington obtained much of the language and ethnology of the San Juan Tribe of California through an aged informant.

Dr. F. H. H. Roberts, jr., conducted extensive archeological excavations at the Long H Ranch, in eastern Arizona, revealing 18 pit houses, 3 jacal, pole, and mud structures, and a pueblo ruin containing 49 rooms and 4 kivas. Mr. J. N. B. Hewitt continued his studies of the Iroquois Indians of Canada and New York State, and Dr. Francis LaFlesche nearly completed his Osage dictionary before his retirement on December 26, 1929. Miss Frances Densmore studied the music of 10 tribes—the Acoma, Menominee, Winnebago, Yuma, Cocopa, Mohave, Yagui, Makah, Clayoquot, and Quilente.

Five bulletins and a list of publications of the bureau were issued during the year, and a total of 24,868 copies of bureau publications were distributed.

INTERNATIONAL EXCHANGE SERVICE

The Exchange Service handled during the year a total of 694,665 packages of governmental, scientific, and literary publications, which represented a total weight of 708,094 pounds. This constitutes an increase of 12 per cent in number of packages, and 14 per cent in weight over the previous year.

The material handled by the Exchange Service includes publications received from this country for transmission to foreign countries, and also those sent from abroad for distribution to addresses in this country. They are classified as parliamentary documents, departmental documents, and miscellaneous scientific and literary publications. The parliamentary and departmental documents include all matter published by Congress and by the Government departments, bureaus, and commissions. These constitute the bulk of the publications handled by the Exchange Service, 74 per cent of the work of the office being conducted in behalf of the United States governmental establishments. The miscellaneous scientific and literary publications are received for distribution chiefly from learned societies, educational institutions, scientific organizations, and museums.

NATIONAL ZOOLOGICAL PARK

Animals added to the collection during the year numbered 759, while 974 were removed through death, exchange, and return of animals, the collection standing at 1,996 at the close of the year. Owing to lack of further housing facilities, it has been necessary to choose very carefully in making additions to the collection, with the result that the park now contains a great many rarities, including a number of species not shown in any other American zoo.

The total attendance at the park was estimated at 2,525,141, about the same as in the preceding year. This total included 28,814 students from 465 different schools. The value of the park as an educational institution, quite apart from its recreational value, is coming to be more and more recognized. Here may be seen visitors of all ages and all degrees of learning, from the young child to the veteran research worker and the advanced medical man, each of whom can learn something of value concerning animals and animal life.

Construction of the new reptile house authorized by Congress was started in March, 1930. The best modern ideas as to the exhibition of reptiles will be incorporated in the building, which will permit the National Zoo to show for the first time an adequate representation of these interesting creatures. The next most urgently needed building is one for small mammals, with which also would be exhibited the great apes; these latter are at present shown in inadequate cages where comparatively few people can see them at a time.

ASTROPHYSICAL OBSERVATORY

The central station at Washington and the three observing stations on Mount Montezuma, Chile; Table Mountain, Calif.; and Mount Brukkaros, South West Africa, have continued the exact measurement of the intensity of the radiation of the sun as it is at mean solar distance outside the earth's atmosphere. The values from Mount Montezuma have continued to be satisfactory and are cabled to Washington each day; the values from Table Mountain are found to be influenced by the haziness or humidity of the atmosphere, and a new method of reduction to allow for these effects was being developed at the close of the year, preliminary trials of which give promising results. Reduction of Mount Brukkaros observations is being postponed until this method is further tested for Table Mountain.

It has recently been discovered that a variation of large percentage exists in the quantity of ozone at high levels above Table Mountain. In order to make ozone corrections to solar constant values obtained there from the year 1925 on, it became necessary to devise a method

of computing the correction from the daily solar constant observations themselves, and this was successfully accomplished during the year.

The most important feature of the year's work was the discovery of an apparently considerable influence of short-period solar variation on the temperature of the United States. The variations as recorded through six consecutive years at Mount Montezuma were compared with temperature changes in Washington, Williston, and Yuma, selecting for the purpose sequences of ascending and descending solar radiation values occupying about four days per sequence. Corresponding to the average change of 0.8 per cent in the sun, there appear to be temperature changes of the order of 5° F. in Washington. The sign of the correlation changes in a very interesting way during the year. Although this relation is complicated, it offers promise for weather forecasting nearly a week in advance. These are tentative results. It is proposed to study barometric pressures as well as temperatures, and to extend the investigation to other parts of the United States and of the world.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE

Since the suspension of publication of the International Catalogue because of the inability of European countries to bear their share of its financial support following the World War, the United States bureau has made it a policy to spend only as much of the annual congressional appropriation as is needed to keep the organization alive pending the resumption of publication.

The report of the assistant in charge, Appendix 9, quotes from an article in *Science* by Dr. E. C. Richardson, who presents a strong case for the importance of revivifying the International Catalogue. His conclusions, in brief, are that the catalogue is an indispensable tool for research workers; that an organization which, if scrapped, would require a \$3,000,000 endowment to build up again, is ready and waiting to resume the work of the catalogue when a very modest fund is made available to it; and that in the catalogue the research trust endowments will find an organization that can give the greatest bibliographical service to research for the least outlay of funds.

NECROLOGY

WILLIAM HOWARD TAFT

William Howard Taft, Chief Justice of the United States and Chancellor of the Board of Regents of the Smithsonian Institution, died in Washington on March 8, 1930. Of a man so prominently before the American public for so many years, it seems unnecessary here to present more than a very brief outline of his career.

Born in Cincinnati in 1857, Taft graduated from Yale University in 1878. He took the law course, and after a short period as law reporter for a newspaper, his public career began. In turn assistant prosecuting attorney, collector of internal revenue of the first district of Ohio, and assistant county solicitor of Hamilton County, he was next appointed judge of the Supreme Court of Cincinnati, and in 1890, Solicitor General of the United States. For eight years beginning 1892 he was United States circuit judge for the sixth judicial district, and in 1901, President McKinley appointed him civil governor of the Philippine Islands. In 1908 came his election as President of the United States, and after the completion of his term, there followed a few years of private life. In 1921 he was appointed Chief Justice of the Supreme Court, from which position he had been forced by ill health to resign only a short time before his death.

Through his many high offices, Mr. Taft had been connected with the Institution for many years, serving as a member of the Institution and its presiding officer, *ex officio*, and as Chancellor of its Board of Regents.

GEORGE PERKINS MERRILL

George Perkins Merrill, head curator of geology, died suddenly in Auburn, Me., on August 15, 1929. Doctor Merrill was born in Auburn on May 31, 1854, and was graduated from the University of Maine with the degree of B. S. in 1879. He pursued advanced studies at Wesleyan and Johns Hopkins Universities which later resulted in the degrees of M. S. and Ph. D. from his alma mater. In 1893 he became professor of geology at Columbian, later George Washington University, continuing his lectures until 1916, and was given the honorary degree of Sc. D. in 1917.

Doctor Merrill's connection with the National Museum began with the organization of 1880. He served in various capacities in the geological division until 1897, when, under a reorganization, he was appointed head curator of the department of geology, which position he held until his death. The growth of the department from a comparatively few specimens, resulting chiefly from the United States Land Office and other early Government surveys, to its present position among the notable geological collections of the world, is largely due to Doctor Merrill's ability as an executive and his devotion and loyalty to the Institution. He was preeminently a museum man and an artist in methods of display, as can be attested by the harmonious arrangement of the exhibition halls under his charge.

Doctor Merrill early became interested in building stones and was regarded as the leading expert on this subject, his opinion being

sought in connection with such important structures as the Lincoln Memorial, the Washington Cathedral, and many other public buildings. His treatise on "Stones for Building and Decoration" ran to three editions.

Again, his researches on rock weathering and soil formation led an eminent authority to say: "The greatest work on the genesis of soils we owe to Merrill." A publication on "Non-Metallic Minerals—Their Occurrence and Uses" further illustrates his versatility in geological research.

Later, the collection of meteorites in the Museum became the object of special interest, his researches on these celestial bodies, resulting in no less than 60 papers, receiving recognition by the presentation of the J. Lawrence Smith medal of the National Academy of Sciences. "The Story of Meteorites," written in popular style, appeared as part 1 of volume 3 of the Smithsonian Scientific Series—"Minerals from Earth and Sky."

Among the most interesting and valuable of his many contributions is his historical work on geological subjects. His "contributions to a History of American Geology," published in 1904 as part of the report of the Smithsonian Institution, was, in 1924, expanded into "The First One Hundred Years of American Geology." He also compiled a "History of American State Geological and Natural History Surveys," issued as Bulletin 109 of the National Museum.

A paper for the Museum's archives, practically completed just before Doctor Merrill left on his vacation from which he never returned, is "An Historical Account of the Department of Geology in the U. S. National Museum"—most timely in its preparation since no other could have been so well qualified to prepare such a record.

ARTHUR BENONI BAKER

Arthur Benoni Baker, assistant director of the National Zoological Park, died in Washington February 8, 1930. Mr. Baker was born at Otisco, New York, in 1858, and as a young man worked in Ward's natural science establishment. At that time Ward's, though a commercial institution, served as a training school for numerous young men who afterwards attained distinction in scientific work. With Mr. Baker were such men as Carl Akeley and William Morton Wheeler. Later Mr. Baker spent eight years fossil hunting in Kansas, and then in November, 1890, accepted a position in the National Zoological Park, where he served continuously until his death, except for a period of six months when he was on furlough and in charge of the Boston Zoological Garden.

In 1909 he made a trip to Nairobi, East Africa, and brought home a collection of animals that had been presented to the Zoo by Sir

Donald MacMillan through Theodore Roosevelt. On the trip out he made a hurried inspection of many zoological gardens in Europe and much of the information he gained there was used in the development of the National Zoological Park. Another expedition was to Porto Rico, where in company with other Smithsonian scientists he made valuable natural history collections.

It is largely due to the knowledge and devotion of Mr. Baker that the Zoological Park has attained its present position. His knowledge of zoos in general was profound; of the National Zoological Park, complete. He retained in his remarkable memory an almost unbelievable mass of detail.

Respectfully submitted.

C. G. ABBOT, *Secretary.*

APPENDIX 1

REPORT ON THE UNITED STATES NATIONAL MUSEUM

SIR: I have the honor to submit the following report on the condition and operations of the United States National Museum for the fiscal year ended June 30, 1930:

The total appropriations for the maintenance of the National Museum for this period amounted to \$762,514, an increase of \$14,490 over the appropriations for the year 1929. Of this amount \$9,500 provided salaries for five additional positions on the staff, namely, an assistant curator of mollusks, an additional clerk in the administrative office, and three sergeants of the watch. This assistance in personnel has very definite value in the administration of the various units concerned and brings added efficiency to the organization as a whole.

A small sum of the increase indicated provided efficiency promotions for a number of trained mechanics who had not been cared for properly when other classes of employees had been promoted previously. There was a further increase to provide for the construction of a gallery to give additional space for study collections in the vertebrate paleontological laboratory, where crowding had become serious. The construction for this is of the same general type as that used for a similar gallery in the National Herbarium.

The second deficiency bill for 1930 contained an item of \$3,500 under repairs and alterations of buildings, available in the fiscal years 1930 and 1931, for the remodelling of a comfort room in the Arts and Industries Building. As this bill became law on July 3, 1930, after the close of the fiscal year here under report, these funds accordingly will be used in the fiscal year 1931, and a statement on them will be made in the report for that year.

Growth in personnel in the National Museum has progressed reasonably, but further additions are required in a number of the administrative units before the staff can be considered properly developed to enable it to function as it should. There are several major groups of animals where systematic workers of high type are needed as curators to carry on necessary research that the Museum may be able to assist the public who desire information concerning the creatures in question. Additional assistance in the scientific grades is also required in some of the major groups where the volume

of work is beyond the capacity of the present staff to handle entirely adequately. Clerical assistance also is at a minimum, and there remain a considerable number of offices in which stenographic and clerical help is not at present available. Naturally this detracts from the efficiency of these offices since scientific workers who should be occupied otherwise are through necessity compelled to devote considerable time to routine work of a clerical nature. It is imperative that regular additions be made to our personnel to assist in these necessary functions. Further assistance is required in the shops, on the guard force, and in the labor force since it is at present necessary annually to obtain temporary workers in the groups concerned. The employment of temporary services, particularly where specialized work is concerned, is of doubtful expediency since necessarily part of the time is occupied in training, and there is more liability to error than with workers on a permanent basis.

Exploration and field work under the National Museum are financed largely by the Smithsonian Institution through its private income, and by friends who supply funds for various projects of particular interest. Existing appropriations for the National Museum are so largely taken up with routine expenditures that there is little available that may be used for research in the field. Further money should come from our appropriations for these ends.

Interest of the general public in scientific matters, particularly of the type that comes within the scope of the National Museum, is plainly evident through the demand that comes for popular exposition in scientific subjects. So far as the National Museum is concerned this interest is shown by the nearly 2,000,000 visitors who come annually to its halls. These persons, together with the many others who have an interest in such things, are among those who contribute to national income in the form of taxes. With their interest in these matters in mind it seems entirely logical that a part of their contributions should be devoted to furthering the development of the Museum which serves them in such various ways.

ADDITIONS TO THE NATURAL HISTORY BUILDING

The Congress gave definite consideration during the year to the question of additional housing for the collections of the National Museum, with the result that the Smoot-Elliott bill authorizing the extension of the Natural History Building through wings at the east and west ends at a cost of \$6,500,000 was passed without a dissenting vote. The bill was approved by the President on June 19, 1930.

Under this authorization it is planned to add to the present building so that it will extend from Ninth to Twelfth Streets on the same

width of base. In general it is contemplated that the style of the present structure will be duplicated, with the ground and third floor occupied by offices and laboratories, and the two intermediate floors devoted to exhibits. Present plans contemplate a request for funds for the preparation of definite architect's designs in the urgent deficiency bill for 1931. The friendly consideration given to the important matter of the authorization for this work by the congressional committees involved has been deeply appreciated by the Institution.

The construction planned will provide adequately for housing needs for the natural history collections. Following this, careful consideration should be given to proper space for the arts and industries series. The present building occupied by these collections, the old National Museum built in 1881, is now antiquated in design and unfitted for modern needs in museum exhibition. It should be replaced by a new structure that will provide ample halls for the showing of the important and valuable exhibits of the type mentioned.

The historical collections of the Nation, of interest and attraction to every patriotic American, at present are also in the old building. These collections, which are steadily growing with the accession of irreplaceable specimens, should be housed in a separate structure where such objects as the Star Spangled Banner and the memorabilia of many famous men may be fittingly and attractively displayed.

COLLECTIONS

Additions to the collections of the National Museum during the fiscal year have reached the total of 410,815 separate specimens, the greater part of these coming as in previous years to the department of biology. The additions, while not quite equal to those of last year, are of comparable value and importance to those of the last few years. Large donations have come from a number of sources, the museum as a governmental institution being recognized as a permanent organization in which valuable material will receive the care and attention that insure long preservation. The growing recognition of the National Museum as a repository of this kind is highly gratifying. Materials of various kinds sent in for examination and report during the year amounted to 1,306 lots, including many thousands of separate specimens. Gifts of duplicate materials made to schools and other educational institutions included 11,474 specimens, while in exchange with other scientific organizations and individuals there were sent out 12,649 specimens, these being duplicates for which return was made to the Museum collections. Loans to scientific workers outside of Washington included 33,208 specimens, many of which were of considerable value.

Following is a digest of the more important accessions for the year in the various departments and divisions of the Museum:

Anthropology.—Collections from Alaska again are of major importance among the accessions in this department. Among these there are two principal lots of material that have come in part through the assistance of the Smithsonian Institution. Doctor Hrdlička in travel down the Yukon River obtained rich collections representing Indian and Eskimoan tribes, and in addition obtained valuable sets of ivory implements from the Bering Sea area. Henry B. Collins, jr., in further field work on St. Lawrence Island and sites on the coast of Bering Sea and Kotzebue Sound secured a collection containing many ivory and other implements that are of great value in supplementing his collections of last year. Further there was obtained by purchase a series of specimens from Point Hope representing various phases of Eskimoan culture. The entire lot represents a selection of western Eskimoan artifacts from the earliest times, still further increasing the value of our excellent series of this kind.

A further collection from Nigeria and the Gold and Ivory coasts of Africa presented by C. C. Roberts has supplemented previous gifts of a similar nature from the same source, until now we have for the first time adequate representation of the Haussa, Fulah, and Yoruba tribes.

The Department of Agriculture, through Dr. E. W. Brandes of the Bureau of Plant Industry, transferred excellent collections of stone axes, decorated human heads, and other objects from New Guinea.

Collections from Tibet were presented by Charles S. Isham, of New York, including prayer stones and other objects of a religious nature, as well as materials of personal adornment. Further collections have come from China through the efforts of the Rev. D. C. Graham, of Szechwan.

In American archeology there came three decorated limestone blocks from the Maya Temple of Chac Mool, deposited by the Republic of Mexico through its Secretaria de Educacion. Valuable specimens were obtained from the excavations in Colorado of Dr. Frank H. H. Roberts, jr., of the Bureau of American Ethnology, and from field work by H. W. Krieger, of the National Museum, in the Dominican Republic, funds for this project having been furnished by Dr. W. L. Abbott.

Through the Bruce Hughes fund there were acquired artifacts of Sumerian and Babylonian origin for exhibition with other materials from the Old World.

Biology.—In the department of biology there were secured extensive collections as a gift of the National Geographic Society, including particularly birds and plants collected by Dr. Joseph F. Rock

in western China, and birds, insects, and plants obtained by E. G. Holt in northern Brazil. Other excellent collections came from the Hon. Gifford Pinchot as the result of a cruise to the Caribbean and Pacific Islands on the yacht *Mary Pinchot*. A notable collection obtained through the cooperation of the Navy Department was secured by Dr. H. C. Kellers, United States Navy, on the Island of Panay, in the Philippines, during service as medical officer to the Naval Solar Eclipse Expedition.

Doctor Bartsch, traveling under the Walter Rathbone Bacon Travelling Scholarship, obtained large series of mollusks in the West Indies, which add remarkably to our collections from that region. Dr. G. A. MacCallum, of Baltimore, presented his entire collection of helminthological material, including many type specimens.

Collections forwarded by the Rev. D. C. Graham from western China include many things of great value, particularly among mammals, birds, fishes, reptiles, and insects. There may be mentioned especially three skins of the giant Panda.

Further excellent collections from Siam were received from Dr. Hugh M. Smith, long an honorary associate of the Institution.

A. C. Bent, a collaborator of the Smithsonian Institution, deposited in the division of birds his collection of North American birds' eggs, a most excellent and complete series. From the Minneapolis Public Library there were obtained more than 1,500 bird skins from the Philippines comprising the Menage collection. The Smithsonian-Parish expedition to Haiti obtained excellent series of birds, reptiles, and other materials. Under the Swales fund, through money left by the late Bradshaw H. Swales, there were secured 34 skins of birds new to the Museum.

The Victorias Milling Co. of Manila presented a considerable number of insects collected by Dr. W. Dwight Pierce. For the division of mollusks there were purchased series of land shells from Jamaica and Haiti through the Chamberlain fund. Through a botanical expedition to Peru and Upper Brazil under E. P. Killip there were acquired more than 27,000 specimens of plants.

Geology.—In the department of geology the single accession of greatest importance during the year was the crystal ball presented to the National Museum by Mrs. Worcester Reed Warner as a memorial to her husband, long a friend to the Smithsonian Institution. This ball of flawless crystal $12\frac{7}{8}$ inches in diameter, weighing $106\frac{3}{4}$ pounds, is believed to be the largest perfect sphere of its kind in existence. It is one of the most striking objects found in the Museum halls.

Through the income of the Roebling fund there have been secured 23 species of minerals not previously represented in our collections,

together with a considerable number of exceptionally fine specimens of other kinds. Among them there may be mentioned a topaz crystal weighing over 7 pounds, sets of tourmaline crystals, and a cut yellow sapphire of 25.8 carats.

Through the Frances Lea Chamberlain fund there were secured blue and yellow diamonds, a Brazilian emerald, and carvings of jade, tourmaline, coral, amber, carnelian and lapis-lazuli.

Valuable specimens of ores and stones have come from several sources. Numerous type specimens have been accessioned in the division of stratigraphic paleontology, particularly fossil plants described by Prof. E. W. Berry. Further fossil plants from the Grand Canyon of the Colorado in Arizona, collected and described by Dr. David White, have been presented by the Carnegie Institution of Washington.

A collection of several hundred fossils from English localities secured by Mr. B. B. Bancroft has come as a deposit from the Smithsonian Institution. Other valuable specimens secured in field work by Dr. Resser have included more than 1,200 Cambrian forms.

Eight articulated skeletons of the fossil horse *Mesohippus bairdi* from the Oligocene of Nebraska were purchased. Large series of excellent fossil horse skulls have come also from the field work of Dr. Gidley in Idaho. Valuable material collected by Mr. C. W. Gilmore in the San Juan Basin, N. Mex., has come to the fossil reptile collection through work financed by the Smithsonian Institution.

Dr. Remington Kellogg and N. H. Boss collecting in Alabama and Mississippi under the auspices of the Carnegie Institution of Washington secured a valuable specimen of zeuglodont, together with other material. There may be mentioned also a complete skull and other bones of a large whalebone whale collected by Dr. Kellogg at Governors Run, Md.

Arts and industries.—The gift of the Rudolph Eickemeyer collection of photographs and books to the section of photography constituted one of the most important accessions to this department, as it includes not only an excellent series of pictorial photographs but also a library of books dealing with this subject, and a series of medals and awards made to Mr. Eickemeyer for the excellence of his work. The gift is further accompanied by an item in the will of Mr. Eickemeyer through which \$15,000 is designated as a fund to be used in connection with this collection.

The collection of Edward Goodrich Acheson memorabilia, recording the researches of this worker, presented by the Acheson Oildag Co., has given important historical material, as has also a collection

of drawings and documents and other things relating to the industrial development of the steam boiler presented by the Babcock and Wilcox Co., of New York City, through its President, A. G. Pratt.

A series of 21 airplane propellers was presented by the American Propeller Co. The United States Coast and Geodetic Survey transferred 26 specimens of early surveying and navigation instruments, including examples 50 to 75 years old.

The family of Leander James McCormick through Robert Hall McCormick presented eight models of labor-saving farm machinery invented and constructed between 1829 and 1835 by Robert McCormick, of Walnut Grove, Va. These include early types of the McCormick reaper.

Many specimens of scientific value added to the study collections of woods include a series of 598 woods from various parts of the world.

To the division of graphic arts there came 1,210 prints as a gift from J. Townsend Russell, jr., including the work of many important engravers. The Eastman Kodak Co. presented a number of items to the section of photographic apparatus.

History.—Silverware formerly owned by Thomas McKean, one of the signers of the Declaration of Independence, presented by Mrs. Frances T. Redwood, and five pieces of chinaware used in the White House by President James Madison, presented by Miss Mary M. McGuire, are among the important accessions in this division.

To the costumes collection there came a rose chiffon velvet gown worn by Mrs. Coolidge, on the occasion of the last formal reception in the White House during the administration of her husband, President Calvin Coolidge. The gown was presented to the Museum by Mrs. Coolidge.

An item of importance added to the military collections was a set of uniforms and accessories of the type worn during the World War and subsequently by officers and enlisted men of the Turkish Army. This material was presented by the Government of Turkey through Ahmet Mouhtar Bey, Turkish Ambassador to the United States.

A considerable series of specimens came as a deposit to the numismatic collections from the American Numismatic Association, including recent coinages of many countries. The Bureau of the Mint of the Treasury Department transferred a number of ancient and modern coins of importance.

The philatelic collection received a large number of specimen stamps from the Post Office Department, as well as a special collection of Chinese stamps presented by the Hon. Liu Shu-fan, Director General of Posts of China.

EXPLORATIONS AND FIELD WORK

Researches in the field have been carried on as usual by various members of the scientific staff of the Museum, principally by means of funds provided by the Smithsonian Institution through its private income, with assistance in some instances in the form of contributions from friends of the organization who have been interested in different projects. Certain investigations have been financed also under some of the specific funds of the Smithsonian. For some expeditions small allotments have been made from the annual appropriations, but these constituted only a small part of the total expenditure for field work, by far the greater portion having come from other sources. An additional appropriation that could be used for field researches is a definite need of the National Museum, and would be of great assistance in promoting its work. A brief account of field work for the present year follows:

During the months of December and January, Henry B. Collins, jr., assistant curator in the division of ethnology, conducted field work in Mississippi, the investigations being carried on in cooperation with the Mississippi Department of Archives and History, that organization being represented by Messrs. Moreau B. Chambers and James A. Ford. The most important result was the finding in Yazoo County of an ancient Indian village site in which the complete floor plan of a large house site was traced by means of the postholes. The structure was round, 60 feet in diameter, and was probably a council house somewhat similar to those described by early explorers in the Creek and Cherokee regions. The opening of the fiscal year in July found Mr. Collins in the field excavating at old Eskimo sites on St. Lawrence Island in Bering Sea, and along the coast of Kotzebue Sound in western Alaska. His work included a reconnaissance of the western Alaskan coast from Norton Sound to Point Hope. Actual excavations were carried on at Cape Kialegak on St. Lawrence, Cape Denbigh, Imaruk Basin, and Point Hope, resulting in a large archeological collection. Work on St. Lawrence Island was begun again in June, 1930, with most important results as indicated by preliminary reports from the field. The National Museum is deeply indebted to the Revenue Cutter Service for its active cooperation in these investigations through transportation provided on its vessels to points otherwise inaccessible.

Field work in the Dominican Republic was continued by Herbert W. Krieger, curator in the division of ethnology, who began archeological and historical studies in that area in 1928. Mr. Krieger's investigations were made possible by the assistance of Dr. W. L. Abbott, whose interest in the island is of long standing and whose

first visit to Santo Domingo was in 1883. Investigations during the current year included a reconnaissance of the mountainous interior of the provinces of La Vega, and of Azua, and actual excavations at former Indian village sites in the valley of Constanza and on the Caribbean coast at Andres, on the Bay of Andres, 25 miles east of the capital city of Santo Domingo. There was no noteworthy distinction between the artifacts recovered from middens at Constanza and at Andres except for the lack of marine products such as bones of fish and turtles, and shells of mollusks in the middens of the central mountains. Shell deposits on the Caribbean coast resemble those found in caves in the province of Samaná, and also those included in the kitchen middens of Monte Cristi Province. Middens throughout the Dominican Republic yield typically Arawakan objects of great variety, ranging from the petaloid polished stone celt, decorated pottery with incised and punctate designs, and molded figurine heads of post-archaic type, to the beveled celt of *Strombus gigas*, shallow undecorated earthenware bowls, crude beads of shell with hour-glass-shape perforation, and other artifacts that in Cuba have been designated as products of the "Ciboney." Frontal-occipital deformation of skulls from cemeteries, fragments of stone collars, and well-known types of Arawak zemis supply additional evidence of the thorough penetration of the island by the Arawak and conversely tend to stress the lack of cultural stratigraphy or evidence of the previous occupancy of the island by pre-Arawak tribes.

From May 15 to September 23, 1929, N. M. Judd, curator of American archeology, was in Arizona supervising the Third Beam Expedition of the National Geographic Society. As a result of these investigations, Dr. A. E. Douglass, of the University of Arizona, was able to complete his tree-ring chronology by establishing a single series of annual growth rings in pine trees, extending from the year 1929 back to 700 A. D. Thus, with over 1,200 years represented, some 40 pre-Spanish Pueblo villages of the Southwest have been correlated with our own calendar—certainly the most outstanding contribution to American archeology in the past quarter century. Following his researches for the National Geographic Society, the curator, at the suggestion of Senator Carl Hayden, visited the Gila and Salt River valleys, Ariz., to examine remaining vestiges of a former network of prehistoric canals and to determine the most feasible means of preserving a permanent record of them. On behalf of the Bureau of American Ethnology, Mr. Judd returned to Arizona in mid-January to cooperate with Lieut. Edwin B. Bobzien and Sergt. R. A. Stockwell, of the Army photographic personnel, in an aerial survey of the major prehistoric canal systems bordering both the Gila and Salt Rivers. The mosaic photographic maps made from

the air resulting from this survey, though not yet completely studied, indicate results of importance.

Doctor Hrdlička, curator of physical anthropology, during the summer of 1929 made his second expedition to Alaska. The work of the present season covered the Yukon from White Horse to Fort Yukon as a reconnoissance, and from Fort Yukon downward continued as an intensive exploration in abandoned and partly washed-away village sites, resulting in valuable collections of skeletal remains and archeological implements. Physical measurements were made on several hundred living natives, some of them the last representatives of their tribes, and facial casts and hundreds of photographs were taken.

Dr. Paul Bartsch, through the Walter Rathbone Bacon Travelling Scholarship of the Smithsonian Institution, continued this season the exploration of West Indian Islands for the study of their terrestrial molluscan fauna, a work begun last year. He left Norfolk, Va., in June, 1929, for Porto Rico, where at San Juan a schooner, the *Guillemito*, was chartered. Doctor Bartsch was accompanied by Dr. William W. Hoffman and his assistant, J. Oliver, who were engaged in other biological studies. The work began in Porto Rico and then continued to Culebra and St. Thomas. On July 14 the party visited the island of St. John and on the 15th St. Croix. Stops were next made at Tortola, San Martin, Anguilla, San Bartholomew, St. Eustatius, St. Christopher, Nevis, Montserrat, and Grande Terre. On July 31 they had reached Guadeloupe; and August 1 and 2 were on the Saints. They next visited Maria Galante and Dominica, and August 7 and 8 were at Martinique. This was followed by exploration of Santa Lucia, St. Vincent, and on August 17 of the Grenadine islets. The expedition arrived at Grenada on August 25 and remained there until the 28th. September 1 to 4 were spent on Trinidad. Margarita Island, off the Venezuelan coast was visited September 7 and 8, followed by stops at Orchilla, El Roque, Bonaire, Curacao, and Aruba. On September 24 the party arrived once more at San Juan, Porto Rico. In addition to a rich harvest of mollusks, this expedition as a by-product secured numerous specimens of animals of many groups as detailed elsewhere in this report.

Rev. David C. Graham, long a cooperator in the field work of the Smithsonian, in the summer of 1929 made a collecting expedition to the Mupin district in Szechwan, the type locality of many of the species discovered by the Abbé Armand David. Doctor Graham started from his headquarters at Suifu on June 15 and reached Mupin 11 days later. He made collections at several localities in the district with good results, obtaining numerous specimens of mammals, among them three flat skins of the "giant panda," birds, reptiles, amphibians, fishes, and insects. He returned in August to

Suifu, characterizing the trip as a successful reconnoissance. A number of forms in the different groups enumerated are new to the Museum, and the entire collection is of great importance.

Through the cooperation of Mr. Lee Parish, of Tulsa, Okla., there was organized in the late winter the Parish-Smithsonian expedition to Haiti, on which Mr. Parish, and Mr. and Mrs. S. W. Parish were accompanied by Mr. W. M. Perrygo of the taxidermy staff. The party sailed from Miami, Fla., on February 15, on the yacht *Esperanza*, passing along the north coast of Cuba, where stops for collecting were made at Gebara, Moa Key, the mainland opposite Moa, and Port Tanamo. In Haiti visits were made to Gonave and Petit Gonave Islands, both north and south sides of the southern peninsula, Ile-à-Vache off the south coast, and Navassa Island. Mr. Perrygo returned by steamer from Port-au-Prince, Haiti, on May 28, arriving in New York June 2. The specimens brought back include 35 mammals, about 600 birds, 206 reptiles, 281 fish, marine invertebrates, and echinoderms, as well as some live animals for the National Zoological Park. The material is of importance and will give much information of value concerning the area covered.

The Museum has also had the valued cooperation of the Hon. Gifford Pinchot in the Pinchot South Sea Expedition which sailed from Brooklyn, N. Y., on March 30, 1929, in the auxiliary yacht, *Mary Pinchot*. The party consisted of the Hon. Gifford Pinchot, Mrs. Pinchot, Dr. H. A. Pilsbry of the Philadelphia Academy of Natural Sciences, and Dr. A. K. Fisher of the Biological Survey, Department of Agriculture, who through cooperation of the survey was detailed to make collections for the National Museum. No stops were made until Key West was reached on April 7, when four days were spent at this interesting place. A short stop was made at Habana, whence the expedition proceeded to Grand Cayman Island. On April 16 and 17 a collection of birds and other zoological specimens was made there, and the party then continued to Swan, Old Providence, and St. Andrews Islands. A hummingbird new to science was taken on the island of St. Andrews. Cristobal, in the Canal Zone, was reached on April 29 and on account of engine trouble the expedition was detained for the following month in the Canal Zone. On June 1 the *Mary Pinchot* left Balboa for Cocos Island, where several days were spent collecting specimens. They continued to the Galapagos Islands on June 11. The first stop was made at Tower Island, followed by visits to Indefatigable, Seymour, Charles, Hood, Chatham, Barrington, Albemarle, Narborough, and a number of smaller islands. Considerable collections of birds and other zoological material were obtained by August 26, when the party continued westward. At Tagus Cove, Albemarle Island, the flightless cormorant and penguin were found. From the Galapagos

Islands the expedition proceeded 3,100 miles to the Marquesas Islands, where they visited Hiva-oo, Fatu-Hiva, Uahuka, Nukahiva, and later Eiao, one of the islands of the northern group. From this point the voyage continued to the Tuamotu Islands. Fruit pigeons, robber crabs and other crustaceans, corals, and shells were collected. The cruise was ended at Papeete, Tahiti; because of the lateness of the season the party returned by steamer to San Francisco, arriving there on October 25, 1929. The *Mary Pinchot* was taken back to Savannah, Ga., by the officers and crew.

Through the untiring energy of Mr. Pinchot and of Doctor Fisher, who represented the Museum on the expedition, large and valuable collections including porpoises, bats, birds, reptiles, fishes, insects, and other animals have come to the Museum as noted elsewhere in this report, numerous forms being new to our collections.

The explorations of Dr. Hugh M. Smith in Siam were continued throughout the year. Among other journeys he made a trip to the mountains of northern and northeastern Siam, where little zoological collecting has been done before. As in previous years a number of species new to science have been obtained.

In May, 1930, Doctor Wetmore made a short collecting trip principally for birds in the mountains of northern Spain, where he obtained a number of forms new to the Museum collections. His work was carried out principally from Puente de los Fierros, Busdongo, and Riaño.

Dr. Joseph F. Rock continued work, under the auspices of the National Geographic Society, in the semi-independent kingdom of Muli, in southwestern Szechwan, China, and also visited the Minyakonka Mountains. He made important collections of birds and plants, the specimens coming to the National Museum as a gift from the National Geographic Society.

Mr. Ernest G. Holt, traveling under the auspices of the National Geographic Society, accompanied a boundary survey party along the Venezuelan-Brazilian frontier, returning to this country with a valuable collection of birds, reptiles, plants, and other material which was presented to the National Museum by the National Geographic Society.

Dr. H. C. Kellers, United States Navy, who through cooperation of the Navy Department was attached as surgeon to the Solar Eclipse Expedition to the island of Panay, P. I., returned with large zoological collections, principally of reptiles, fishes, and marine invertebrates, which are of great scientific value.

Dr. J. M. Aldrich was in Europe at the beginning of the fiscal year examining types of species of flies in the British Museum. In July he proceeded to Bergen, Norway, and after a brief collecting excursion there continued to Sweden, where he spent a successful season

collecting at Åre. During this work he ascended the Åreskutan, a mountain 5,000 feet high, where Zetterstedt, 100 years before, had made important entomological collections.

Doctor Aldrich left Washington on May 15, 1930, for a collecting trip to the high altitudes of Idaho, Washington, Oregon, and northern California, a journey on which he was absent at the end of the fiscal year.

Mr. H. H. Shamel, of the division of mammals, was detailed for about three weeks in May, 1930, to collect natural history specimens in southwestern Missouri and eastern Kansas. Twenty days were spent in Barry and McDonald Counties, Mo., and a few days in Montgomery and Harvey Counties, Kans. The collection obtained included 65 mammals, 399 fishes, 34 birds, and between 100 and 125 reptiles, invertebrates, and insects, as well as three living mammals for the National Zoological Park. The black-tailed jack rabbit obtained in Barry County, Mo., was of interest as it is said to have been in this region for only about 20 years, though previously recorded for Missouri from Vernon County.

E. D. Reid, of the division of fishes, was detailed from March 20 to April 12, 1930, to make collections of fresh-water animals in the highlands of North Carolina, Tennessee, and Georgia. He secured a fine lot of amphibians.

E. P. Killip, associate curator of plants, accompanied by Mr. Albert C. Smith and Mr. W. J. Dennis, made an extended journey to eastern Peru and Amazonian Brazil, remaining in the field from April 9, 1929, to November 15, 1929. The expedition, under the Smithsonian Institution, made general botanical collections and investigated especially the various plants used as fish poisons. The New York Botanical Garden cooperated in the project by allowing Mr. Smith, a member of the Garden staff, leave of absence for the work. Nearly 27,000 specimens were collected, and such studies as have been made to date show that a large number of novelties were obtained. Many species have never before been brought back to American herbaria.

Dr. A. S. Hitchcock, custodian of the grass herbarium, spent the months from July to October, 1929, in South and East Africa, collecting and studying grasses. He visited Cape Colony, Transvaal, Portuguese East Africa, Tanganyika, Zanzibar, Kenya, and Uganda, obtaining a large number of specimens. He was an officially invited guest of the British Association for the Advancement of Science meeting in South Africa.

Mrs. Agnes Chase, of the grass herbarium, made an expedition to Brazil during the months October to May, visiting the States of Rio de Janeiro, Espirito Santo, Minas Geraes, Goyaz, Sao Paulo, and

Mattogrosso. More than 2,500 collection numbers were obtained, with an average of five specimens to each number.

For four months of the last fiscal year and extending into the early part of this, Dr. W. F. Foshag was engaged in field work in the borax regions of California, Nevada, and Oregon, collecting under the Roebing fund of the Smithsonian Institution with the collaboration of the Harvard Mineralogical Museum. The purposes of the expedition were to study the mineralogy and geology of the borax deposits, with particular regard to their origin, and to obtain for the Museum a comprehensive collection of typical minerals and ores. It was thought desirable to undertake the work at this time since changes in the borax industry have rendered obsolete many of the most interesting of the deposits. Some very fine exhibition specimens, a comprehensive series illustrating the geology and mineralogy of the deposits, and much duplicate material resulted.

In the latter part of April Doctor Foshag was detailed to examine some mineral localities in North Carolina. Through the courtesy of Messrs. Burnham S. Colburn and Will Colburn of Biltmore Forest, he was enabled to visit Spruce Pine, Balsam Gap, Mason's Mountain, Webster, and Statesville, and to collect rare uranium and other minerals.

In order to carry out an expressed wish of the late Dr. Frank Springer, Dr. R. S. Bassler visited Europe for the purpose of making casts of various type specimens of crinoids preserved in foreign museums. His chief object was to obtain facsimiles of the specimens described by Barrande, which, with many other mementoes of that famous paleontologist, are preserved in the National Museum at Prague, Bohemia, this having been the scene of his greatest work. Under most pleasant conditions and with the hearty cooperation of the authorities at the museum, this work was carried to a successful conclusion. Doctor Bassler was also enabled to visit other European museums and various collecting fields. At the museums the paleontological collections were studied and personal contact established with the authorities; the time at the collecting fields was devoted mainly to a study of the stratigraphy, in order to secure data for the furtherance of work on our collections.

Late in the year, Doctor Bassler, accompanied by Dr. Ferdinand Canu, made brief field trips in New England and along the Atlantic coast in furtherance of their studies on Bryozoa.

Dr. C. E. Resser continued researches on the Cambrian of the Rocky Mountain region under the Smithsonian Institution. For a portion of the time he was accompanied by Dr. L. J. Moraes of the Brazilian Geological Survey, who was interested in similar problems. Doctor Resser's chosen field was in Montana, with a stop in the Yellowstone National Park to examine certain peculiar

structures caused by algal deposits. Camp was next established on the Bridger Range in Montana, where a restudy of the stratigraphy proved it to be much more complicated than was previously supposed. Thence a move westward and northwestward led into the Blackfoot country where the pre-Cambrian and Cambrian rocks were examined. Following this various ranges in southwestern Montana were visited, and the last part of the season was spent in the Teton Mountains in extending the studies of the previous season. Small collections were made, the expedition being devoted mainly to field observations.

The field expedition under the Smithsonian in charge of Mr. C. W. Gilmore covered certain badland areas extending from Kimbetoh northward to Farmington in the San Juan Basin, N. Mex. Although the surface indications gave every promise of yielding rich returns, it was found that the majority of the leads consisted of single bones. Individual skeletons had evidently been widely scattered before interment, and only occasionally were portions of skeletons found together, which fact, however, did not prevent the collecting of material of much scientific interest, as several new species appear to be represented and some known forms are new to the fauna. The collection, as a whole, is a decided contribution to the meagerly known faunas of the area.

The expedition under the Smithsonian by Dr. J. W. Gidley to the Snake River Valley, Idaho, inaugurated toward the end of the last fiscal year, was attended with unusual success—so much so, in fact, that a second expedition to the same region is now in progress. Well preserved remains of a rare extinct species of horse comprise the most important part of the collection, while gravel deposits in the vicinity yielded a large species of bison, a giant muskox, camel, horse, and other extinct animals of the Pleistocene period.

Later in the year Doctor Gidley continued his researches dealing with the problem of the association of early man with the extinct mammalian fauna in Florida, the work being financed by contributions from Mr. Childs Frick and by the Smithsonian. Worth-while data and material were obtained, though the expedition was greatly hindered by excessive rains which rendered it impossible to work out some of the most promising localities.

Under the auspices of the Carnegie Institution of Washington, Dr. Remington Kellogg, assisted by Mr. Norman Boss, was occupied for a month in exploration of the Eocene (Jackson) deposits in Alabama and Mississippi for zeuglodont remains. The resulting small collection of these comparatively rare fossils was presented to the Museum. Messrs. Kellogg and Boss also made one trip of three days to the near-by Miocene localities along Chesapeake Bay to collect cetacean remains.

In August members of the Maryland Geological Survey brought to the Museum's attention the discovery of a large whalebone whale skull located in Miocene deposits in the vicinity of Governors Run, Md. Dr. Remington Kellogg, with the assistance of Mr. A. J. Poole and members of the Maryland Survey staff, were successful in collecting it, the specimen being one of the first of this type discovered.

Late in the fiscal year Mr. C. W. Gilmore was detailed to head an expedition into the Eocene of the Bridger Basin in southwestern Wyoming, and Dr. J. W. Gidley returned to the scene of his 1929 collections in Idaho. As both expeditions will continue well into next year, detailed accounts will go over until the next annual report.

BUILDINGS AND EQUIPMENT

The usual routine repairs have kept the buildings of the National Museum in proper condition. At the beginning of the year the work of safeguarding the dome of the Natural History Building had just been finished. Before opening the rotunda to the public the walls were steam-cleaned, the plastered surfaces repainted, and the floor repolished. The rotunda was opened finally on October 23, 1929, after having been closed to visitors for nearly two years. Walls and ceilings in the north entrance to the Natural History Building, as well as various exhibition, office, and laboratory rooms, were repainted. The roadways on the east and west sides of the buildings were closed by gates to prevent their use as thoroughfares by unauthorized vehicles; this step was taken because of several accidents that had taken place there. With the assistance of the office of Public Buildings and Public Parks, a steel gallery was erected in the storage rooms of the division of vertebrate paleontology to provide additional space for the storing of fossils.

In the Arts and Industries Building the fountain in the center rotunda was removed because in recent months several visitors intent on other matters had stumbled over the coping and fallen into the water. Roofs and exterior woodwork were repainted, and various rooms and offices were redecorated. Work in enlarging the women's rest room was begun, a special item of \$3,500 toward this project being included in the second deficiency act approved after the close of the year.

The power plant was in operation from September 27, 1929, to May 28, 1930. The consumption of coal was 3,502 tons, an amount in excess of that burned during the previous fiscal year. The average cost was \$5.65 per ton. The Steamboat Inspection Service examined the boilers during the year and made certain suggestions as to their condition. The elevators have been regularly inspected by the District of Columbia inspector. The total electric current produced amounted to 655,253 kilowatt-hours, manufactured at a

cost of 1.78 cents per kilowatt-hour, including interest on the plant, depreciation, repairs, and material. The amount of electric current produced represents an increase of approximately 6,500 kilowatt-hours over that of last year, and the plant is now operating at its maximum capacity. As demands for electric current increase steadily it will be necessary during the coming fiscal year to purchase a limited amount from the local company during the winter season, in addition to the regular purchase made during the summer season when the Museum plant is not in operation.

The ice plant manufactured 435.5 tons of ice at the average cost of \$1.71 per ton; this cost represents a definite reduction over that for the previous year.

During the year 7 exhibition cases and bases, 308 pieces of storage, laboratory, and other furniture, and 2,224 drawers of various kinds were added, the greater part of these being manufactured in our shops.

MEETINGS AND RECEPTIONS

The lecture rooms and auditorium of the National Museum were used during the present year for 135 meetings covering the usual wide range of activities. Government agencies that utilized these facilities for hearings, meetings, lectures, and other special occasions included the Bureau of Chemistry and Soils, the Forest Service, the Graduate School, Food, Drug and Insecticide Administration, the Extension Service of the United States Department of Agriculture, and the United States Public Health Service. The Graduate School and the Forest Service of the Department of Agriculture arranged a series of addresses during the year on various matters concerned with their work. Scientific societies that met regularly in the auditorium or small lecture room included the Vivarium Society, the Entomological Society of Washington, the Society for Philosophical Inquiry, the Anthropological Society of Washington, and the Helminthological Society of Washington. Meetings were held also by the Washington Academy of Sciences, the Wild Flower Preservation Society, the Potomac Garden Club, the Twentieth Century Club and Federation of Women's Clubs, the Washington Society of Engineers, and the Washington Glider Club. The National Association of Retired Federal Employees held regular meetings through the year, as did groups of high schools for special addresses.

On December 26 Dr. Heinrich Reis of Cornell University, retiring president of the Geological Society of America, delivered an address in the auditorium. A series of special meetings was held by the Anthropological Society for lectures by Dr. Fay-Cooper Cole on

January 7, on January 21 by Dr. Aleš Hrdlička, on February 4 by Dr. Clark Wissler, on February 18 by Dr. Herbert J. Spinden, and on March 4 by Mr. Neil M. Judd. On January 14 Dr. Hrdlička delivered an address on Organic Evolution before the Washington Academy of Sciences, and on February 20, Prof. E. W. Berry of Johns Hopkins University spoke before the same organization on the Origin and Evolution of Plants. On April 16 Dr. Charles B. Davenport of the Carnegie Institution of Washington lectured on the Mechanism of Organic Evolution.

The Food Standards Committee of the Food, Drug, and Insecticide Administration, United States Department of Agriculture, held a public hearing on April 30 in room 43. On January 15 the Maryland-Virginia Farmers' Marketing Association held a business meeting in the auditorium. The seventh National and fifth International Oratorical Contest for the Evening Star area was held in the auditorium on May 8, with J. Loren Freund of Gonzaga College, Miss Virginia Carr, of Oakton High School, Va., and Miss Frances Gertrude McKim, St. Mary's Seminary, St. Mary's City, Md., as speakers. On May 27 the sixth annual National Spelling Bee was held in the auditorium. From June 18 to 20 the United States Public Health Service held a conference with State and Territorial health officers in room 43. Addresses were made by Dr. Ray Lyman Wilbur, Secretary of the Interior, Surg. Gen. H. S. Cumming, and others.

From June 18 to 24 the meeting rooms were used by the Extension Service of the United States Department of Agriculture for conferences in connection with the 4-H Club camp.

A memorial meeting was held August 16 to commemorate the service to science of the late Dr. George P. Merrill, head curator of geology of the United States National Museum.

On the evening of December 10 the formal opening of the exhibition of paintings purchased under the Henry Ward Ranger bequest was held in the National Gallery of Art from 9 to 11. The District of Columbia section of the Woman's Auxiliary to the American Institute of Mining and Metallurgical Engineers arranged a reception in the National Gallery rooms on December 26 for ladies in attendance at the meetings of the Geological Society of America.

MISCELLANEOUS

The exhibition halls of the National Museum were open during the year on week days from 9 a. m. to 4.30 p. m. and with the exception of the aircraft building were open Sunday afternoons from 1.30 to 4.30; all museum buildings remained closed on December 24 and 25, in accordance with presidential order, and were closed also on New Year's Day.

The flags on the Smithsonian and Museum buildings were placed at half mast on November 19, 1929, out of respect to the late James Wilson Good, Secretary of War. They were flown at half mast from March 9 to April 7, 1930, out of respect to ex-President William Howard Taft, associated for many years with the Smithsonian Institution as a member of the Institution, presiding officer ex officio, Regent, and Chancellor. On November 13 the flag pole on the Smithsonian building was found to be in a dangerous condition and was removed so that no flag was flown on that building until April 10, 1930, when a new pole was put in place on the north tower.

Visitors to the Museum during the year totaled 1,894,989, a decrease of approximately 35,000 from the record of the preceding year. This decrease apparently reflected changed economic conditions in the country. Attendance in the several buildings of the National Museum was recorded as follows: Smithsonian Institution, 282,482; Arts and Industries, 863,479; Natural History, 625,326; Aircraft, 123,700. The average daily attendance for week days was 5,125, and for Sundays 10,317. The increase in the Sunday average of nearly 4,000 persons per day is a certain indication of the need for opening the exhibits to the public on Sunday afternoons.

During the year the Museum published 16 separate volumes and 35 miscellaneous papers, while the distribution of literature amounted to 87,323 copies of its various books and pamphlets. Additions to the Museum library included 2,317 volumes and 668 pamphlets, obtained partly by exchange, partly by donation, and partly by purchase. The library of the National Museum as separate from that of the Smithsonian Institution proper now contains 76,879 volumes and 108,297 pamphlets. Much work was done in arranging the catalogues of these collections. The Museum has 36 sectional libraries in connection with its various divisions, each containing the particular books relating to the work involved. These are in addition to the main libraries that house the works of general reference.

On October 1, 1929, Dr. R. S. Bassler was made head curator of the department of geology. Dr. Charles E. Resser was designated on December 1 curator of stratigraphic paleontology. Dr. W. F. Foshag was made curator of the division of mineralogy and petrology on September 1, and in addition was given charge of the work of the division of physical and chemical geology. Mr. Edward P. Henderson was appointed on November 16 assistant curator in the division last mentioned.

Dr. Charles W. Richmond, long associate curator in the division of birds, was given the title of curator on July 1. On September 16 at Dr. Richmond's own request he again became associate curator

and Dr. Herbert Friedmann was appointed curator. The division of ethnology was reorganized during the year, with resulting change in status for H. W. Krieger, curator, and H. B. Collins, jr., assistant curator. Julian S. Warmbath was appointed taxidermist on October 1. Wm. H. Egberts was given the title of chief preparator of the department of anthropology, and Norman H. Boss that of chief preparator in vertebrate paleontology. Miss Leila G. Forbes was appointed assistant librarian to succeed Miss Isabel L. Towner, who resigned on September 7. Miss Gertrude L. Woodin succeeded Miss Ethel A. L. Lacy, chief of the accessions department, who severed her connection with the Museum on September 15. On July 1 Mrs. Florence L. Grock was appointed principal accounting and auditing assistant. Michael Cahillane, Clarence R. Kyte, and William H. Smith were appointed sergeants July 1. On August 16 Mr. Cahillane was advanced to lieutenant, and Wm. H. Vanneman was made sergeant on September 1.

Three employees left the service through the operation of the retirement act—Edgar W. Hanvey, cabinet-maker, after a service of nearly 32 years; A. C. Dufresne, lieutenant of the watch, after 18 years on the guard force; and Carl A. Ohlson after nearly 18 years' service as watchman. The Museum lost through death during the year seven of its active workers and one member of its honorary scientific staff. Dr. George P. Merrill, head curator of geology, died August 15, 1929. Dr. Jesse Walter Fewkes, collaborator in ethnology, died on May 31, 1930. Other losses by death included Miss Ava L. Bennett, clerk stenographer, on November 11, 1929; Robert M. Campbell, bricklayer and plasterer, July 14, 1929; Ira W. Johnson, oiler, October 26, 1929; William L. Brawner, watchman, August 25, 1929; Walter J. Ferguson, watchman, October 8, 1929; and Mrs. Alberta Buchanan, charwoman, May 13, 1930.

Respectfully submitted.

ALEXANDER WETMORE,
Assistant Secretary.

APPENDIX 2

REPORT ON THE NATIONAL GALLERY OF ART

SIR: I have the honor to submit herewith my report on the operations of the National Gallery of Art for the fiscal year ending June 30, 1930.

THE GALLERY COMMISSION

The ninth annual meeting of the gallery commission was held in the Regents' room of the Institution at 10.15 a. m., December 10, 1929, the members present being as follows: Mr. Gari Melchers, chairman; and Messrs. Herbert Adams, Charles L. Borie, jr., James E. Fraser, J. H. Gest, Frank J. Mather, jr., Charles Moore, James Parmelee, E. W. Redfield, E. C. Tarbell, and Dr. Charles G. Abbot, ex-officio.

Due to the absence of Dr. W. H. Holmes, secretary of the commission, Mr. James G. Traylor was requested to act as temporary secretary.

The minutes of the previous annual meeting were read and approved, followed by the reading and approval of the secretary's report on the activities of the gallery for the year.

A number of the matters mentioned in this report were discussed very fully and with reference to the Langhorne collection, the following resolution was adopted:

Resolved, That Mr. and Mrs. Marshall Langhorne be invited to loan to the National Gallery of Art their collection of paintings as a temporary exhibition, preferably at a time convenient to them as well as to the commission.

Doctor Abbot explained the steps taken in regard to the offer of Mr. John Gellatly and its acceptance, stating that through an act of Congress funds would be provided for the maintenance of the collection during the next four years. He added that special cards of admission to the collection in New York had been prepared and that he would be glad to supply the members of the commission with them. After discussion, the following resolution was adopted:

Resolved, That a committee consisting of Doctor Abbot and Mr. Melchers be appointed to prepare a formal acknowledgment of appreciation and thanks to Mr. Gellatly for his generous gift.

The acknowledgment duly prepared and forwarded is as follows :

JANUARY 6, 1930.

DEAR MR. GELLATLY: At the annual meeting of the National Gallery of Art Commission, held at the Smithsonian Institution, Washington, D. C., on the 10th day of December, 1929, the following resolutions were unanimously adopted :

Resolved, That the deep and appreciative thanks of this commission be, and they hereby are, extended to Mr. John Gellatly, of New York City, for his generous action in donating to the National Gallery of Art the fine and valuable art collection which, during a long term of years, he has assembled with so much pains and care, and with such rare discrimination and artistic taste.

Resolved, That this collection constitutes an important addition to the National Gallery of Art; that it will for all time to come be an outstanding feature of this Institution; and that it represents a great national asset in the development of the art of our country.

Resolved, That these resolutions be spread in full upon the minutes of this meeting, as a lasting tribute to the generosity of the donor, and that a copy thereof be transmitted to Mr. Gellatly with assurance of the warm regard and sincere appreciation of the members of the National Gallery of Art Commission, and with their cordial good wishes for his future health and happiness.

Sincerely yours.

(Signed) CHARLES G. ABBOT,
Secretary, Smithsonian Institution.

(Signed) GARI MELCHERS,
Chairman, National Gallery of Art Commission.

MR. JOHN GELLATLY,
New York City.

The Ranger exhibit was very fully discussed. It was the sense of the meeting that members of the commission should make their inspection of the exhibit entirely as individuals and that each member should give his personal expression of opinion in regard to the selections proper to be added to the National Gallery. It was also decided that these votes should be regarded as strictly confidential. The following resolution was adopted :

Resolved, That the commission extend to the Council of the National Academy of Design an invitation as a body to view the Ranger exhibit.

Mr. Moore brought up the matter, which had been referred to previously, of providing a fund for the encouragement and support of young artists until they had "arrived." He had not been successful in getting one of the large philanthropical organizations to arrange for this as yet, but he was glad to say that such provision had been incorporated in the will of a public-spirited citizen to become operative upon his death.

EVENTS OF THE YEAR

Among the more noteworthy events of the year was the assemblage in Washington and exhibition in the gallery of the group of paintings purchased by the Council of the National Academy of Design in

accordance with provisions of the Henry Ward Ranger bequest. This bequest provides for the purchase from year to year of paintings by American artists which shall be assigned to art institutions throughout the country, the National Gallery being given the privilege of selecting from these purchases such examples as may be regarded as desirable additions to the national collections. There is thus established in perpetuity a procedure which should prove of prime importance in preserving a representative series of American paintings continuing from year to year and period to period, an historical measure not heretofore undertaken by any nation.

Purchases under the Ranger bequest began in 1920, and in 1930, 78 examples had been secured and distributed. The assemblage of these in Washington, December 10, 1929, was arranged to enable the gallery commission to inspect the works and make tentative selections for the national collection. Final steps on acceptance can not be taken, however, until within the 5-year period beginning 10 years after the artist's death in each case.

It has been suggested that acceptance of paintings by living painters be regarded as tentative acceptances only so that any work chosen may be returned to the recipient institution whence it came when a superior work by the same artist becomes available.

The addition of a single Ranger bequest work per year to the gallery would certainly not seem excessive, and at this rate in 100 years the gallery would be enriched by the ownership of 100 of the most masterly American works of the century.

Two distinct points of view may be held regarding acceptances of paintings by the gallery. First, that there should be included only recognized Old World masterpieces with possibly occasional and rare outstanding examples of American work of corresponding art value, and second that the National Gallery should first of all take this opportunity to build up an unbroken series of American works of the first order.

In the opinion of the director the authorities of the American National Gallery looking to the far future should not be content with accumulations of the art of the past, representing closed chapters of the history of art. As a great people we should have an assured art future, a future worthy of systematic record and representation.

A million Old World masterpieces installed in great American buildings will not make an American National Gallery, and in his view a commission or other official body concerned in the establishment of a national art collection should recognize the distinction

between the history of the world art of the past and the story of art in America to be revealed as the centuries and millenniums pass.

The essential concept of an American National Gallery is the assemblage of an adequate number of the best available products of the American brush (or chisel) from period to period and this is exactly what the Ranger bequest aims to do.

SPECIAL EXHIBITIONS HELD IN THE GALLERY

The special exhibitions held in the gallery during the fiscal year formed no small part of its activities and are as follows:

THE HENRY WARD RANGER EXHIBITION

The exhibition of paintings purchased to date by the Council of the National Academy of Design from the Henry Ward Ranger fund, was opened on the evening of December 10, 1929, with a reception by the Secretary and Regents of the Institution, the director of the gallery, and the members of the National Gallery of Art Commission. The National Academy of Design was represented by Mr. Charles P. Curran, corresponding secretary; Mr. Albert P. Lucas, assistant corresponding secretary; Mr. Henry Prellwitz, treasurer; and Messrs. Charles S. Chapman, Ernest L. Ipsen, and Carl Rungius, of the council of the academy. The exhibit closed on January 31, 1930.

All of the paintings, 78 in number, are by outstanding contemporary American artists and, as stated above, under the terms of Mr. Ranger's will the National Gallery has the privilege of claiming any of them which it deems desirable for the national collections within the 5-year period beginning 10 years after the artist's death, and ending 15 years after his death. In the meantime the pictures are assigned by the Council of the National Academy of Design to institutions which maintain a free art gallery. These institutions lent the pictures for the present exhibition, in which for the first time the Ranger fund pictures have been assembled in one place. Payment of expenses of transportation and insurance was made possible through a grant of \$1,000 voted by the Carnegie Corporation of New York. This grant was procured through the endeavors of Mr. Gari Melchers, chairman of the National Gallery of Art Commission.

Members of the National Gallery Commission submitted, confidentially, their votes as to the paintings exhibited which were suitable for permanent exhibition by the gallery. This vote is preserved for the information of those who in future will be charged with selecting pictures from the Ranger collections.

SCULPTURE BY EDGARDO SIMONE

An exhibition of 54 works of sculpture in plaster, bronze, and marble, by Signor Edgardo Simone, of Italy, was shown from February 8 to March 9, 1930, and included busts of S. E. Duce Benito Mussolini, the Rt. Hon. Sir Esme Howard, Justice Oliver Wendell Holmes, Gen. John J. Pershing, the Hon. George W. Wickersham, and others. Cards announcing the opening of the exhibit were issued by the gallery.

PORTRAITS BY EDWIN B. CHILD

An exhibition of 36 portraits in oil, by Edwin B. Child, of Dorset, Vt., of celebrities in the American educational and scientific worlds, was shown from February 15 to April 7, 1930. Cards announcing the exhibit were issued by the gallery.

PAINTINGS, SCULPTURES, ETC., BY CONTEMPORARY HUNGARIAN ARTISTS

An exhibition of paintings in oil, water-color, and pastel; sculpture in wood, bronze, and marble; etchings; and works of applied arts including metal work, etc., goldsmith's work, church plate, and textiles, by contemporary Hungarian artists, assembled by the Hungarian National Council of Fine Art, was shown under the patronage of Count László Széchenyi, minister from Hungary, and under the auspices of the American Federation of Arts and the American-Hungarian Foundation from April 23 to May 31, 1930. The exhibition was opened with a private view on April 23, invitations being issued by the regents and secretary of the Smithsonian Institution. An illustrated catalogue of 25 pages was furnished by the federation.

PAINTINGS BY AMERICAN NEGRO ARTISTS

An exhibition of paintings by American Negro artists, assembled under the auspices of the Harmon Foundation of New York and shown under the patronage of the committee on race relations of the Washington Federation of Churches, was held in the foyer of the Museum from May 30 to June 8, 1930. Cards announcing the opening of the exhibit were issued by the National Museum, the gallery being charged with the task of addressing and mailing the cards, installing the exhibit, and with the unpacking, packing, and shipping.

ART WORKS RECEIVED DURING THE YEAR

Accessions of art works by the Smithsonian Institution, subject to transfer to the National Gallery on approval of the advisory committee of the National Gallery of Art Commission, are as follows:

An oil painting, *In the Studio*, by A. Tamburini, Florence, received from Mme. Annita Gaburri, to be labeled "Presented in memory of Mrs. Ada Byron Gaburri by her granddaughter, Soldi Matier Wilcox." (Deposit.)

A beautiful example of enamel work in the form of a watch by Moulinié & Legandory, Geneva, Switzerland; bequeathed to the Institution by Miss Charlotte Arnold H. Bryson, late of Wilmington, Delaware. (Deposit.)

Original plaster models of busts of prominent American personages made by Moses Wainer Dykaar during the last decade as follows; presented by the sculptor with the understanding that they be available to him when needed. It is also understood that the Institution shall not make copies of these without Mr. Dykaar's permission:

Dr. Charles D. Walcott.	Alexander Graham Bell.
Hon. Robert L. Owen.	Hudson Maxim.
Hon. Thomas R. Marshall.	Justice Wendell P. Stafford.
Hon. Champ Clark.	Adm. George Collier Remy.
Samuel Gompers.	William Henry Holmes.
Hon. Nicholas Longworth.	Hon. Charles Curtis.
Mrs. Nicholas Longworth.	Calvin Coolidge.
Gen. George Owen Squier.	Mrs. Calvin Coolidge.
Edwin Markham.	Hon. Carter Glass.

LOANS ACCEPTED BY THE GALLERY

A painting by an old master, attributed to Bartolommeo Schidone (1560-1616) representing the Madonna and Child; lent by Mme. Bronislava De Brissac Hulitar, of New York City, through Hon. Carroll L. Beedy, M. C.

A Madonna, by Giovanni Battista Salvi (1605), the property of Mrs. Charles J. Fox of Tientsin, China; lent through Miss Genevieve B. Wimsatt, of Washington, D. C.

The Italian masterpiece, the Immaculate Conception with the Mirror, by Murillo; withdrawn by the owner on June 24, 1929; was again lent by Mr. DeWitt V. Hutchings of Riverside, Calif., March 22, 1930.

Minerva, an original oil painting of the sixteenth century—relic of the Spanish Conquest of Central American as described by the owner; lent by Miss May Warner, Washington, D. C.

Four portraits: Admiral Holdup Stevens, 2d, by Robert Hinckley, Mrs. Thomas Holdup Stevens, 2d, by an artist unknown, Mrs. John Bliss (sister of Mrs. Stevens) by an artist unknown, and Hon. Eben Sage of Middletown, Conn., by Chester Harding; lent by Mrs. Frederick C. Hicks, Washington, D. C.

Bust in bronze by Joseph Anthony Atchison, of Dr. John Wesley Hill, chancellor of Lincoln Memorial University, Cumberland Gap, Tenn.; lent by Joseph Anthony Atchison, Washington, D. C.

Five paintings: Head of Christ attributed to Giorgione, Holy Family and St. John by M. Albertinelli, Baptism of Christ by G. B. Tiepolo, the Doctor's Visit by Jan Steen, and Italian Landscape by Richard Wilson; lent by Mrs. Marshall Langhorne, Washington, D. C., June 16, 1930.

Portrait bust in marble by Moses Wainer Dykaar of Hon. Nicholas Longworth, Speaker of the House of Representatives; lent by the sculptor.

A water-color painting of dogwood blossoms by Elizabeth Muhlhofer, of Washington, D. C.; lent by the artist.

DISTRIBUTIONS

Three paintings: Madonna and Child by Alonzo Cano, Madonna by Carlo Dulci, and Saint with Book by Giuseppe Ribera (Spagnoletto); withdrawn by the owners, Mr. and Mrs. Maxim Karolik, of Washington, D. C.

The Old Mill, a painting attributed to Hobbema, lent by Mrs. Mary F. C. Goldsborough; withdrawn by the executor of Mrs. Goldsborough's estate, Edmund K. Goldsborough, Washington, D. C.

Bust in bronze of Hon. Wade H. Cooper by Joseph Anthony Atchison, lent by the sculptor; withdrawn by Mr. Atchison.

The portrait by Gambardella of Mrs. Charles Eames, lent yearly by Mrs. Alistair Gordon Cumming was withdrawn for the winter by Mrs. Cumming.

Four paintings: Baptism of Christ by G. B. Tiepolo, Christ in the Temple by G. B. Tiepolo, Head of Christ attributed to Giorgioni, and Portrait of Henry, Prince of Wales (or Prince Charlie) by C. Janssens van Ceulen; withdrawn by Mrs. Marshall Langhorne in the autumn of 1929.

LOANS RETURNED TO THE GALLERY

The painting by Alexander Wyant entitled *The Flume*, Opalescent River, Adirondacks, one of two from the William T. Evans collection lent to the White House on request of Mrs. Herbert Hoover in May, 1929, has been returned to its former place in the gallery.

THE HENRY WARD RANGER FUND PURCHASES

The paintings purchased during the year by the Council of the National Academy of Design from the fund provided by the Henry Ward Ranger bequest, which are under certain conditions prospec-

tive additions to the National Gallery collections, are as follows, including the names of the Institutions to which they have been assigned:

Title	Artist	Date of purchase	Assignment
77. Near Monterey.....	Arthur Hill Gilbert, A. N. A. (elect).	December, 1929.	Springville High School Art Association, Springville, Utah.
78. Margery and Little Edmund.	Edmund C. Tarbell, N. A.do.....	The Grand Rapids Public Library, Grand Rapids, Mich.
79. Gold Mining, Cripple Creek.	Ernest Lawson, N. A. . .	April, 1930.....	Charleston Public Library Board (Charleston, West Virginia, Art Association).
80. Big Starbuck.....	Roy Mason, A. N. A. (elect).do.....	Reading Public Museum and Art Gallery, Reading, Pa.

The paintings purchased during former years and unassigned at the close of the last fiscal year (1929) have been subsequently assigned as follows:

68. Mlle. Maria Safanoff, by Irving R. Wiles, N. A.; to Mount Holyoke College, South Hadley, Mass.

71. The Harvest Moon. by Charles Melville Dewey, N. A.; to the Fine Arts Society of San Diego, San Diego, Calif.

76. Fishing Fleet, by Malcolm Humphreys; to Davenport Municipal Art Gallery, Davenport, Iowa.

COPYING PAINTINGS

While the gallery has no facilities for the accommodation for artists desiring to copy works of art in its collections, permission is given in special cases. During the present fiscal year two artists, both of Washington, D. C., were permitted to copy portraits in the Harriet Lane Johnston collection: Mrs. Charles H. L. Johnston (Birdie Abbott Johnston) copied the portrait of Lady Hammond by Sir Joshua Reynolds, and Miss Angelica Frances Small copied the portrait of Miss Kirkpatrick by George Romney.

LIBRARY

The gallery library continued to increase by gift, purchase, and subscription in volumes, pamphlets, periodicals, etc., Mr. J. Townsend Russell, jr., being the principal benefactor of the year.

PUBLICATIONS

HOLMES, W. H. Report on the National Gallery of Art for the year ending June 30, 1929. Appendix 2, report of the secretary of the Smithsonian Institution for the year ending June 30, 1929, pp. 1-9.

LODGE, J. E. Report on the Freer Gallery of Art for the year ending June 30, 1929. Appendix 3, report of the secretary of the Smithsonian Institution for the year ending June 30, 1929, pp. 10-16.

Catalogue of an exhibition of paintings by contemporary American artists purchased by the Council of the National Academy of Design from the Henry Ward Ranger fund in accordance with the provision of the Ranger bequest dated January 21, 1914. On view in the National Gallery, Natural History Building, United States National Museum, December 10, 1929, to January 31, 1930. United States Government Printing Office, Washington: 1929.

Exhibit of Sculptures by Edgardo Simone, National Gallery of Art, United States National Museum, February 8 to 28, 1930, inclusive. Leaflet of 3 pp. privately printed.

Catalogue of a group of portraits in oil by Edwin B. Child on view in the National Gallery of Art in the United States National Museum, February 15 to March 30, 1930. Leaflet of 4 pp., privately printed.

Catalogue of an Exhibition of Paintings, Sculpture, and Works of Applied Arts by Contemporary Hungarian Artists shown under the auspices of the American Federation of Arts and the American-Hungarian Foundation. Exhibited at The National Gallery of Art, Smithsonian Institution, April 23–May 31, 1930. Washington, D. C. (Pp. 1–25; 16 plates, privately printed.)

Catalogue of an Exhibition of Paintings by American Negro Artists at the United States National Museum, Smithsonian Institution, Washington, D. C. May 30–June 8, 1930. Price 25 cents. (Pp. 1–15; 9 illustrations on 6 plates. Washington, privately printed.)

Respectfully submitted.

W. H. HOLMES,
Director.

DR. C. G. ABBOT,
Secretary, Smithsonian Institution.

APPENDIX 3

REPORT ON THE FREER GALLERY OF ART

SIR: I have the honor to submit the tenth annual report on the Freer Gallery of Art for the year ending June 30, 1930:

THE COLLECTIONS

Additions to the collections by purchase are as follows:

BOOKBINDING

- 30.46. Egyptian, fourteenth century. Dark brown leather on pasteboard, lined with chestnut brown leather. Decoration in blind and gold tooling.
- 30.47. Egyptian, fourteenth century. Dark brown leather on pasteboard, lined with lighter brown leather. Decoration in blind and gold tooling.

BRONZE

- 30.26. Chinese, fifth century B. C. A ceremonial wine jar of the type *yü*, with a bail handle.
- 30.37. Chinese, period of the Sui dynasty (A. D. 589-618). A mirror, with the back decorated with six panels containing galloping animals in relief. The addition of red and green color to the central medallion is unusual.
- 30.38. Chinese, eighth to ninth century. T'ang period. A mirror with a scalloped edge. The back is decorated with floral designs in relief.
- 30.45. Chinese, seventh to tenth century. T'ang period. A mirror with a festooned rim. The back is covered by a sheet of gold, decorated with an embossed scroll design containing flowers and birds.
- 30.54. Chinese, eleventh century, B. C. Early Chou period. A ceremonial vessel, of the type *fang i*. White bronze patinated with azurite, malachite, and cuprite. Inscriptions: inside of the cover and the body of the vessel.

JADE

Chinese, Han period (206 B. C.-A. D. 220). A group of objects from a single burial, as follows:

- 30.27. A necklace made of four strands of gold wire, braided, to which are attached four carved pendants and six cylindrical beads of white jade.
- 30.28-30.29. Two combs of white jade, with a formal carved ornament at the top.
- 30.30. A hair ornament (?) of carved white jade, somewhat altered by burial.
- 30.31. A peach-shaped cup on a low foot, of greenish-white jade, with cream-colored areas of alteration. A delicate engraved pattern is on the outside of the cup.
- 30.43. A figure of a dancer, a detached ornament, carved in white jade.

MANUSCRIPTS

- 30.1. Persian, thirteenth to fourteenth century. A ms. copy of the *Shāh Nāmāh*, with leaves detached from the binding, containing 42 miniatures, 29.25-47, 30.2-20. (See under *Painting*.)
- 30.23- Egyptian, eighth to ninth century. Two parchment leaves from a
- 30.24 Korān, written in *Kūfic* script on both sides in black and red with additions of gold.
- 30.55. Egyptian, fourteenth century. Mamlūk period. A double title page from a Korān, richly illuminated in colors and gold. Vellum.
- 30.56- Egyptian, fourteenth century. Mamlūk period. Four leaves from a
- 30.59. Korān with illuminated chapter headings and other ornaments. Vellum.
- 30.60- Egyptian, eighth to ninth century. Eleven leaves from a Korān written
- 30.70. in *kūfic* script in dark brown ink with dots of red and gold. One illuminated title. Vellum.

PAINTING

- 30.2- Persian, thirteenth to fourteenth century. Mongol period. Nineteen
- 30.20. miniatures in colors and gold, illustrating episodes in the *Shāh Nāmāh* (see 30.1 above).
- 30.21. Persian, thirteenth to fourteenth century. Mongol period. A miniature in colors and gold on paper; an illustration in a Persian translation of the *Universal History* by Muhammad Ibn Djarīr al Tabarī.
- 30.22. Indian, early seventeenth century. Mughal, School of Jahāngir. Portrait of a young prince. In colors and gold on paper.
- 30.25. Indian, seventeenth century. Rajput, Basohli School. Śri-Krishna rises to welcome Sudāmā. In full color and gold on paper.
- 30.36. Chinese, dated in correspondence with A. D. 968. Sung dynasty. A painting on silk from "The caves of a thousand Buddhas" at Tun-huang. The deity Avalokiteśvara with two attendant divinities. In the register below, the family of the donor is portrayed, and an inscription records the offering.
- 30.48- Persian, Fifteenth century. Timurid period. Two miniature paintings
- 30.49. in colors and gold on paper, illustrating episodes in the *Shāh Nāmāh*. The first shows a group of warriors; the second, a prince receiving two personages.
- 30.71- Egyptian, early fourteenth century. Mesopotamian school. Seven
- 30.77. miniatures in full color and gold, originally illustrations in a ms. book on *Automatics*.
- 30.78. Persian, fourteenth century. Mongol period. A miniature painting in colors and gold on paper. An illustration of an episode in the *Shāh Nāmāh*, showing a king reclining within an arched doorway, his horse tethered outside.

PORCELAIN

- 29.83. Chinese, early eighteenth century. Yung Chêng period. A bowl made at the Ku Yüeh Hsüan studio for imperial use. The exterior is decorated with four landscape vignettes executed in red enamel over glaze, with inscriptions in black. The space between the vignettes is filled with a *mille-fleur* design in colored enamels, over glaze. Reign mark, in blue enamel.

- 30.35. Chinese, early eighteenth century. Yung Chêng period. A small bowl of the Ku Yüeh Hsüan type, decorated with a design of black birds and autumnal branches in over-glaze enamels. Reign mark, in blue enamel.

POTTERY

- 29.82. Chinese, twelfth to thirteenth century. Sung dynasty. A bowl of Ting ware, with extremely thin walls, decorated with a phoenix and cloud design, stamped in the paste, under a transparent colorless glaze.
- 30.32. Chinese, T'ang dynasty. (A. D. 618-907.) A large ovoid jar, decorated with medallions in relief. It was originally glazed in green; now largely altered to a silvery iridescence.
- 30.33-30.34. Chinese, T'ang dynasty. A long-necked bottle, with trefoil mouth, ornamented with medallions in relief, and accompanied by a high stand, with cut-out openings in its sides. Both bottle and stand were glazed in green, which has altered to a silvery iridescence.

SCULPTURE, BRONZE

- 29.84. South Indian, late eleventh or early twelfth century. Cola period. A processional image of Pärvatī or of a deified queen. Black patina.

SILVER

- 30.40. Chinese, T'ang dynasty. A ladle, with a long curved handle and lobed bowl. A delicate floral ornament is engraved on the outside of the bowl and on the handle.
- 30.42. Chinese, T'ang dynasty. A small covered cup, the outside ornamented with a delicate engraved floral design, against a stippled ground.
- 30.50. Chinese, T'ang dynasty. A box in the form of a clamshell, hinged. The outside is engraved with a bird and flower scroll design, against a stippled ground. The larger areas of the design show traces of gilt.
- 30.51. Chinese, T'ang dynasty. A cup with a curved, foliated handle. The outside is covered with a delicate engraved design of birds and animals in a grape-vine scroll. The larger areas are gilded. The ground is filled with stippling.
- 30.52-30.53. Chinese, T'ang dynasty. Two small round boxes with fitted covers. The outsides of both are decorated with delicate engraved designs of bird and flower scrolls, of different patterns, on a stippled ground. The larger areas are gilded.

SILVER-GILT

- 30.39. Chinese, eighth-ninth century. T'ang dynasty. A melon-shaped box with eight lobes, covered with a grape-vine design, carved in slight relief and gilded. The finial is a toad-like figure, in high relief.
- 30.41. Chinese, ninth century. T'ang dynasty. An oblong lobed cup on a high lotus-leaf base. Both inner and outer surfaces are covered with delicate engraved designs, and in the center of the bowl is a rosette, in repoussé relief.
- 30.44. Chinese, ninth century. T'ang dynasty. A circlet for a head of a Buddhist divinity, decorated with figures of *apsarases* with musical instruments, among foliated scrolls, in repoussé relief. The ground is filled with fine stippling.

Curatorial work within the collection has as usual included the documentary study of inscriptions on the new purchases from the Far East, as well as those upon objects already in the collection. Many objects and reproductions of objects have been submitted by other institutions and by private owners for expert opinion or for translation of inscriptions in Chinese, Japanese, or Tibetan. The total number of such reports made by the curator embraces 834 objects and 185 photographs of objects.

During the winter a large group of paintings in the Near Eastern section, which was purchased *en bloc* in 1907 from its then owner, Col. H. B. Hanna, and which comprised a miscellany of Mughal, Rajput, and Persian paintings, has undergone complete revision and reclassification. In this work the curator has had the expert assistance of Dr. A. K. Coomaraswamy, of the Museum of Fine Arts, Boston. The entire collection of Near Eastern painting and manuscript leaves is now in process of being remounted and stored in boxes of an improved type made in the Freer Gallery shop for this purpose. The collection of Chinese bronzes, also, has been given a new and improved type of storage so arranged as to be most easily accessible to the student.

The care and preservation of objects in the collection has this year included work that can be itemized as follows:

- (1) Remounted:
 - 2 Chinese panel paintings.
 - 1 Chinese scroll painting.
 - 3 Japanese panel paintings.
 - 2 Japanese screen paintings.
- (2) Restored and rebacked.
 - 2 Chinese velvet wall hangings.
- (3) Repaired:
 - 11 pages of Egyptian calligraphy on parchment.
 - 7 Persian paintings.

Changes in exhibition have involved a total of 243 objects as follows:

- 49 Whistler etchings.
- 45 Whistler lithographs and lithotints.
- 46 Whistler water-color paintings.
- 13 Whistler pastel drawings.
- 2 Chinese bronze vessels.
- 2 Chinese bronze mirrors.
- 1 Chinese bronze and gold mirror.
- 1 Chinese bronze sword.
- 6 Chinese jades.
- 3 pieces of Chinese silver.
- 2 pieces of Chinese silver-gilt.

- 3 Chinese paintings.
- 5 Chinese porcelains.
- 5 pieces of Chinese pottery.
- 2 velvet wall hangings.
- 6 Egyptian bookbindings.
- 4 Indian paintings.
- 6 Japanese screens.
- 8 Japanese panels.
- 19 Persian paintings.
- 1 South Indian bronze.
- 1 piece of Syrian enameled glass.
- 13 pages of calligraphy.

On March 25, 1930, a special exhibition of "New Accessions" was opened to the public, in Galleries I and II.

THE LIBRARY

During the year, there have been added to the main library 93 volumes, 37 unbound periodicals, and 229 pamphlets. Twenty-nine volumes were sent to the bindery. A list of the new accessions to the library accompanies this report as Appendix A (not printed).

The library is in process of being catalogued under the direction of the librarian of the Smithsonian Institution, Mr. W. L. Corbin. This work was begun in November, 1929, and is not yet completed.

REPRODUCTIONS AND PAMPHLETS

Four hundred and five new negatives of objects have been made. Of these, 182 were made for registration photographs and 223 for special orders. The total number of reproductions available either as carbon photographs or as negatives from which prints can be made upon request is now 3,094.

Eighty-two lantern slides have also been added to the collection, making a total of 911 available for study and for sale.

The total number of sales of reproductions, at cost price, is as follows: Photographs, 1,600; post cards, 16,683; lantern slides, 79; negatives, 2. Eighty-three lantern slides have been loaned for lecture purposes.

Of booklets issued by the gallery, the following number were sold at cost price:

F. G. A. pamphlets.....	150
Synopsis of History pamphlets.....	116
List of American paintings.....	53
Annotated Outlines of Study.....	22
Gallery books.....	259
Floor plans.....	11

BUILDING

The work of repairing the building has included this year the repainting of the corridors on the lower floor, and of Galleries III and IV. The shop has been constantly occupied with the building of equipment of various sorts, including new cases for bronze storage, other exhibition cases and easels, and, interesting for its novelty, a motor-driven machine for the unrolling of Chinese scrolls before a moving-picture camera. The report of the superintendent, which gives a detailed account of shop work, accompanies this report as Appendix C (not printed).

ATTENDANCE

The gallery has been open every day, from 9 until 4.30 o'clock, with the exception of Mondays, Christmas Day, and New Year's Day.

The total attendance for the year was 120,651; the total attendance for week days, 80,624; the total Sunday attendance, 40,027. The average Sunday attendance is more than twice as great as that of week days; 769 being the average Sunday attendance, and 310 the average for week days. The two peaks of the year were reached in August and April, with totals of 17,800 and 17,541, respectively; the lowest attendance was that of January, with a total of 5,561.

The total number of visitors to the offices was 1,349. Of these, 156 came for general information; 172 to call upon upon members of the staff; 308 to see objects in storage; 116 to submit objects for examination; 16 to study the building and installation methods; 128 to study in the library; 95 to see the reproductions of the Washington Manuscripts; 15 to make photographs and sketches, and 3 to make tracings; while 212 came to purchase photographs.

Sixteen groups, ranging from 1 to 30 persons, were given docent service in the exhibition galleries, and 10 classes in groups ranging from 3 to 8 persons were given instruction in the study room.

Two lectures by eminent authorities in their respective fields were given during the winter in the auditorium at the Freer Gallery. These were as follows:

January 6, 1930: Sir Aurel Stein on "The Caves of the Thousand Buddhas"; illustrated.

February 20, 1930: Dr. A. K. Coomaraswamy on "Indian Sculpture: Intention and Development"; illustrated.

On May 7, at 5 o'clock, in compliment to the Library of Congress, the auditorium was opened to the society of "The Friends of Music in the Library of Congress," for a concert of music written for harpischord, piano, viola d'amore, and viola.

FIELD WORK

In spite of greatly disturbed conditions now and long since prevailing in China, Mr. Bishop was able, last spring, to make investigations of considerable interest at the site of the Liang dynasty (A. D. 502-556) tombs, not far from Nanking. The detailed report on these excavations has not yet been received; but, meanwhile, copies of Mr. Bishop's letters from the field are submitted herewith as Appendix B (not printed).

In June, after a profitable winter at the Imperial University, Kyōto, Mr. Wenley joined Mr. Bishop in China. He has been recalled for work at the gallery where he is due to arrive next December.

Mr. Acker has been making excellent progress in his Chinese studies at the University of Leiden, and has also found opportunity to see some of the important Chinese collections in Paris, Berlin, and Stockholm. He will pass one more school year under Professor Duyvendak at Leiden.

PERSONNEL

Miss Christabel E. Hill, stenographer to the field staff, resigned from her position August 23, 1929.

Mr. Carl W. Bishop, associate curator, left for field work in China on November 16. He was married to Miss Daisy Furscott in Berkeley, Calif., on November 30.

Miss Eleanor Thompson took up her position as office assistant on November 15, 1929.

Dr. Ananda K. Coomaraswamy spent July 12, February 19 and 20, in reclassifying Persian and Indian paintings and drawings.

Mr. Y. Kinoshita worked at the gallery from February 1 to June 26, on the preservation of oriental paintings.

Mrs. R. W. Edwards, who has been associated with the Freer Gallery since February, 1924, resigned from her position on May 22, 1930, because of removal from the city.

Mrs. R. W. Helsley, who was at the Freer Gallery between November, 1920, and March, 1922, returned to it on May 5, 1930, by transference from the administration office, National Museum.

Dr. Chi Li, ethnologist, who has been associated with the field staff in China for several years, resigned his position on June 30, 1930, to take up other scientific work in Peiping.

Respectfully submitted.

J. E. LODGE,

Curator, Freer Gallery of Art.

Dr. C. G. ABBOT,

Secretary, Smithsonian Institution.

APPENDIX 4

REPORT ON THE BUREAU OF AMERICAN ETHNOLOGY

SIR: I have the honor to submit the following report on the field researches, office work, and other operations of the Bureau of American Ethnology during the fiscal year ended June 30, 1930, conducted in accordance with the act of Congress approved February 20, 1929. The act referred to contains the following item:

American ethnology: For continuing ethnological researches among the American Indians and the natives of Hawaii, the excavation and preservation of archeologic remains under the direction of the Smithsonian Institution, including necessary employees, the preparation of manuscripts, drawings, and illustrations, the purchase of books and periodicals, and traveling expenses, \$68,800.

Mr. M. W. Stirling, chief, in the month of August, 1929, visited Gallup, N. Mex., from whence he went to the Long H Ranch, Ariz., in order to view the archeological excavations being conducted there by Dr. F. H. H. Roberts, jr., of the bureau staff. From the Long H Ranch he proceeded to Pecos, N. Mex., for the purpose of attending the Conference of Southwest Archeologists, which was held at the site of the excavations being conducted by Dr. A. V. Kidder.

From Pecos Mr. Stirling went to Hanover, N. H., to deliver an address before the annual meeting of the Social Science Research Council.

On February 1 Mr. Stirling went to Key West, Fla., where, through the courtesy of Mr. Lee Parish, he was enabled to conduct an archeological reconnaissance of the Ten Thousand Islands in Mr. Parish's yacht, the *Esperanza*. Upon the completion of this reconnaissance a visit was made to Lacoche, Fla., where a small mound was excavated. Mr. Stirling next proceeded to Tampa Bay, where a large sand mound near Safety Harbor was excavated.

Work was continued on the preparation of manuscript descriptive of the field work, and a number of short articles were prepared and published in various periodicals. Frequent lectures on anthropological topics were given during the year before various scientific and educational bodies.

Dr. John R. Swanton, ethnologist, conducted field work during July and August, 1929, in Mississippi and Oklahoma. He collected further ethnological material from the Mississippi Choctaw, and

corrected notes that were obtained the year before. In Oklahoma Doctor Swanton visited most of the existing Square Grounds of the Creeks, witnessed parts of several ceremonies, and obtained descriptions of their ceremonial arrangement. The Choctaw material has been incorporated in his manuscript, "Source Book for the Social and Ceremonial Customs of the Choctaw," which is ready for publication. The data Doctor Swanton collected on Creek Square Grounds will form a short paper and is ready for publication.

Doctor Swanton corrected throughout the words of his Timucua dictionary, completing work begun last year; and in addition he began the work of translating them, with the help of the original Timucua-Spanish religious works in which the material is preserved. Further work was done on the map of Indian tribes, the scope of which has been extended so as to cover Mexico, Central America, and the West Indies; the accompanying text has also been amplified. On June 20 Doctor Swanton left Washington to resume field work in the State of Louisiana.

On July 1, 1929, Dr. Truman Michelson, ethnologist, went to Shawnee, Okla., to continue his study of the Algonquin Tribes of that State, where he obtained a fairly representative collection of Kickapoo mythology. From these studies Doctor Michelson found that his statement made 14 years ago that Kickapoo mythology, on the whole, is closest to Fox mythology, still holds valid. It should be mentioned that Kickapoo shares with certain northern Indian tribes a number of tales which are either absent from the Fox or their knowledge is confined to but few of them. Despite some secondary changes, Kickapoo is an archaic Algonquian language. It may be added that their religious ideas and practices hold their own with great vigor. Obviously, the type of social organization is quite similar to those of the Sauk and Fox. Work among the Sauk and Shawnee was chiefly linguistic. The new data clearly show that Shawnee is further removed from Sauk, Fox, and Kickapoo than supposed; yet it is abundantly clear that it is closer to them than to any other Algonquian languages. Only a short time was given to Cheyenne, practically nothing but linguistics being considered. The opinion given by Doctor Michelson in the twenty-eighth annual report of the bureau that Cheyenne must be considered aberrant Algonquian is fully sustained. Some social customs were noted, among them male descent. Work among the Arapaho was mainly linguistic.

A large part of the time in the office was spent in preparing for publication a large memoir on the Fox Wâpanôwiwëni. This is now in an advanced stage of preparation. He also corrected the proofs of Bulletin 95 of the bureau which was issued during the year.

On June 3, 1930, Doctor Michelson left Washington to renew his work among the Algonquin Tribes of Oklahoma. He spent at first a

short time on the Cheyenne. It is now possible to formulate some of the phonetic shifts that have transformed Cheyenne from normal Algonquian. It is also clear that some of the commonest words in normal Algonquian are lacking. He then took up work again among the Kickapoo and obtained an even larger body of myths and tales. Some new facts on their social organization were likewise obtained.

Mr. John P. Harrington, ethnologist, worked during the year securing the language and much of the ethnology of the San Juan tribe of California through an aged and ill informant, Mrs. Ascensión Solórsano, at Monterey, Calif. Having learned the language which has scarcely been spoken since 1850, through the circumstance that both her mother and father, who were fullblooded Indians, talked it together all their lives, the mother dying at 84 years of age and the father at 82, she retained a knowledge of an extinct language and a dead culture, and lived long enough to enable Mr. Harrington to record practically all that she knew, thus filling in a great blank in California ethnology. So sick that she was scarcely able to sit up even at the beginning of the work, Mr. Harrington continued this work at her bedside until well into January, 1930, and no Indian ever showed greater fortitude than this poor soul who served the bureau up to almost her last day. The material recorded consisted of every branch of linguistic and ethnological information and contains many new and important features.

Mrs. Solórsano during all the latter part of her life was recognized as a *doctora*. Her little home at Gilroy, Calif., was a free hospital for down-and-outs of every nationality and creed, and here the sick and ailing were treated with Indian and Spanish herb medicines and were seen through to the last with motherly care and no thought of recompense. Mr. Harrington obtained full accounts of how she treated all the various diseases, and of the herbs and other methods employed. Specimens of the herbs were obtained and identified by the division of plants of the National Museum.

Songs were obtained on the phonograph, and accounts of ceremonies, and description of all the foods of the Indians and how they were cooked were obtained. Accounts of the witcheries of the medicine men take us back to earliest times, and are mingled with the early history of the tribe at the San Juan Mission. Many stories and anecdotes about early Indians were recorded and throw much light on the thought and the language of the times. Names of plants and animals and places were studied and identified, Dr. C. Hart Merriam generously helping in this and other sections of the work. In spite of her age and infirmities Dona Ascensión's mind remained remarkably clear and her memory was exceptional. No greater piece of good fortune has ever attended ethnological research of a tribe that was culturally of the greatest importance,

forming an all but lost link between the cultures of northern and southern California.

After the death of Dona Ascensión at the end of January, 1930, Mr. Harrington spent some weeks in checking up on the information in every way possible, copying from the archives at San Juan Mission, working at the Bancroft Library at Berkeley, Calif., and interviewing many individuals, and returned to Washington in April, since which time he has been engaged in preparing a report on the work for publication.

Dr. F. H. H. Roberts, jr., archeologist, devoted the fiscal year to a number of activities. July, August, and the first part of September, 1929, were spent conducting excavations at the Long H Ranch, between St. John's and Houck, in eastern Arizona. The work was begun in May and continued through June of the preceding fiscal year so that the investigations extending from July to the middle of September were a continuation of work already under way. At the completion of the summer's work the remains of three different types of houses had been uncovered. These included 18 pit houses, the vestiges of three jacal, pole and mud structures, and a pueblo ruin with 49 rooms, and 4 kivas or circular ceremonial rooms.

The pit houses were found to correspond in many respects with those dug up by Doctor Roberts in the Chaco Canyon, in northwestern New Mexico, during the summer of 1927 and described in Bulletin 92 of the Bureau of American Ethnology. The jacal houses were found to have been quite comparable to a similar type found in southern Colorado during the field season of 1928. The latter were extensively described in Bulletin 96 of the bureau. The pueblo revealed an unusually clear cut story of the growth and changes in a communal dwelling. The building had not been erected according to a preconceived plan but had grown by degrees through the addition of new units. It was quite evident that such additions had taken place at four different periods in the occupation of the building.

Doctor Roberts returned to Washington in October. The autumn months were devoted to reading and correcting galley and page proofs for the report on the investigations of the 1928 field season. This paper is called "Early Pueblo Ruins in the Piedra District, Southwestern Colorado," and is Bulletin 96 of the bureau.

The winter months were devoted to working over the specimens obtained from the summer's excavations and preparing a report on the investigations. This included the drawing of 31 text figures, consisting of 70 drawings, 1 map showing the region in general and the location of the sites, and the writing of a 600-page manu-

script. The latter is called "The Ruins at Kiatuthlanna," the Zuñi Indian name for the locality.

Doctor Roberts assisted Mr. Neil M. Judd of the United States National Museum in cataloguing the collections made along the Piedra River in southwestern Colorado in the summer of 1928. Illustrated lectures on the archeology of the Southwest were delivered before a number of Washington organizations, and information on the archeology of the New World was supplied in response to many letters of inquiry.

On May 12, 1930, Doctor Roberts left Washington for Denver, Colo., where one week was spent in studying new accessions in the Colorado State Museum and the City Museum of Denver.

Leaving Denver, Doctor Roberts proceeded to Gallup, N. Mex., and from there to the Zuñi Indian Reservation. One week was devoted to an archeological reconnaissance of the Zuñi area. As a result of this a small pueblo ruin was chosen as the scene for intensive investigations, and under a permit from the Department of the Interior excavations were started. By July 1 a burial mound containing 40 interments had been investigated and 16 rooms and 2 kivas or ceremonial chambers in the pueblo had been cleared of their accumulated débris. In addition to much valuable information, 150 specimens, including pottery and other art facts, had been secured.

Mr. J. N. B. Hewitt, ethnologist, was engaged in routine office work from July 1, 1929, to May 7, 1930, and from the latter date until the close of the fiscal year he was engaged in field service in Canada and very briefly in New York State.

Mr. Hewitt devoted much careful research among various documents to ascertain, if possible, the symbolic significance of white and purple wampum beads, respectively, and also when these are mixed in definite proportions and arrangement on strings or belts; but much reading of documents which might bear on the question was comparatively barren of any satisfactory results. He was led to this study because, in modern time at least, strings of wampum function and have functioned quite prominently in the public transactions of the Council of the League of the Iroquois. Wampum strings are an essential accompaniment in the use of the ritual of the Requickenng Address of the Council of Condolence and Installation of the League.

Mr. Hewitt also transliterated an Ottawa mythic text from the common missionary alphabet into that of the Powell phonetic system designed for the use of collaborators of the bureau.

He also typed in native Mohawk text the chanted ritual, the Eulogy of the Founders of the League, as intoned by the Father

Tribal Sisterhood, incorporating therein such revisional additions, textual and grammatic, as had been found necessary by extensive field studies. Mr. Hewitt also typed in native Onondaga text this ritual in the form in which it is intoned by the Mother Tribal Sisterhood; these two versions of the eulogy differ chiefly in the introductory paragraphs and also in the terms or forms of address. Mr. Hewitt continued to represent the Bureau of American Ethnology, Smithsonian Institution, on the United States Geographic Board, and as a member also of its executive committee.

On the afternoon of May 7, 1930, Mr. Hewitt left Washington on field duty, returning to the bureau July 1. During this trip he visited the Grand River Reservation of the Six Nations of Indians near Brantford, Canada, the Tuscarora Reservation near Niagara Falls, N. Y., and the Onondaga Reservation near Syracuse, N. Y. Largely through his own knowledge of the several Iroquois languages, he was able to recover the hitherto lost meanings of several passages in the texts relating to the league. These recoveries now make the entire structure of the League of the Iroquois clear and consistent.

During the fiscal year Dr. Francis LaFlesche, ethnologist, read the proof of his paper "The Osage Tribe: Rite of the Wa-xo-be," which will be published in the forty-fifth annual report of the bureau. At the time of Doctor LaFlesche's retirement, December 26, 1929, he had nearly completed an Osage dictionary upon which he had been working for several years.

SPECIAL RESEARCHES

The music of 10 tribes of Indians has been studied during the past year by Miss Frances Densmore, a collaborator of the bureau, in continuance of her research on this subject. These tribes are the Acoma, Menominee, Winnebago, Yuma, Cocopa, Mohave, Yaqui, Makah, Clayoquot, and Quileute. The first tribe given consideration was the Acoma, the work consisting in a completion of the study of records made in Washington by Philip Sanche. These records were made for the chief of the Bureau of American Ethnology. Thirteen were transcribed as representative of the series. An outstanding peculiarity of these songs is a gradual raising or lowering of the pitch during a performance. In some instances the pitch was changed a semitone, in others a tone and a half, and one example contained a rise of a whole tone during one minute of singing. This was regarded as a mannerism and the song was transcribed on the pitch maintained for the longest time.

The work on Yuman and Yaqui music consisted in the retyping of almost all the text on these tribes, made necessary by the combining

of individual manuscripts into a book. The analysis of each song was scrutinized and several songs previously classed as "irregular in tonality" were otherwise classified. The preparation for publication of a book on Menominee music has been practically completed. The manuscript contains 460 pages, with transcriptions of 140 songs, and a large number of illustrations. The material collected at Neah Bay, Wash., and submitted in the form of 13 manuscripts during previous years, has been unified under chapter headings and retyped for publication. Interesting features of these songs are the prominence of the tetrachord and the large number of songs with a compass of three or four tones.

In July and August, 1929, a field trip was made to the Menominee and Winnebago in Wisconsin, the former tribe receiving the more consideration. This was the third visit to the Menominee and work was done at Keshena, Neopit, and Zoar. In June, 1930, another trip was made to the Winnebago in Wisconsin, this being the fourth visit to that tribe. Songs were recorded in the vicinity of Tomah and also near Wisconsin Rapids. One of the singers at the former locality was Paul Decora, whose home is in Nebraska. Fourteen songs were recorded by this singer and found to contain the same changes of pitch which marked the performance of the Acoma singer. In some songs the pitch was steadily maintained, while in others it was gradually raised or lowered a semitone during the first rendition, the remainder of the performance being on the new pitch.

John Smoke is an industrious Winnebago farmer, who retains a "water-spirit bundle" inherited from his ancestors and uses it in a ceremonial manner. He allowed Miss Densmore to see this bundle, explained its use and benefits, and recorded two of its songs which are sung when its contents are exposed to view. A Winnebago flute player known as Frisk Cloud recorded three melodies on a flute made of metal pipe, and said "the love songs are words put to flute melodies." He is also a maker of flutes and described the measurements of an instrument in terms of hand and finger widths and hand spreads. Miss Densmore purchased the instrument on which the melodies had been played.

Winnebago songs and another flute performance were recorded by George Monegar, a blind man living near Wisconsin Rapids, who is considered one of the best authorities on old customs. He also related the legend of the origin of the flute.

Songs of 10 classes were recorded on this trip, with old and modern examples of one class. The recorded songs comprise those of the water-spirit bundle, hand game, and moccasin game, love songs, war songs, and a lullaby, and songs of the Green Corn, Friendship, Fortynine, and Squaw dances.

At the suggestion of Senator Carl Hayden, Mr. Neil M. Judd, curator of archeology in the United States National Museum, made a brief reconnaissance in September, 1929, for the purpose of ascertaining the most practicable method of surveying, at this late date, the prehistoric canal systems of the Gila and Salt River Valleys, Ariz. Most of the ancient canals had been obliterated through agricultural practices; others were threatened with early destruction under the program of the Coolidge Dam project. Following his preliminary investigation, he recommended an aerial survey as the only feasible means whereby the former aboriginal canal systems could be located and mapped for permanent record.

Since haste was a prime factor, in view of the extensive grading operations within the Pima Indian Reservation, the War Department generously came to the aid of the Smithsonian Institution by providing an observation plane and personnel. Mr. Judd left Washington January 12, 1930, and proceeded to Phoenix, Ariz., by way of Tucson and Sacaton. Unfavorable flying conditions served to delay inauguration of the survey. Ground haze in the early morning and smoke in the afternoon obscured the ground except for a 2-hour period at mid-day. Lieut. Edwin Bobzien, pilot, and Sergt. R. A. Stockwell, photographer, both from Crissy Field, the Presidio, San Francisco, pursued their assigned tasks as rapidly as possible. They made approximately 700 exposures, of which half were vertical photographs taken from an altitude of 10,000 feet. These have since been assembled into mosaic maps. As was anticipated, the aerial survey disclosed numerous prehistoric canals not visible from the ground. With the mosaic maps in hand these ancient canals must now be examined individually and their locations identified with reference to nearby section lines. This task properly should be done during the late autumn or winter months and within the next few years.

Without the personal interest of Senator Hayden and the cooperation of the War Department, the Smithsonian Institution would have found it impossible to undertake the aerial survey above mentioned.

In late November, 1929, and again in early May, 1930, Mr. Judd made brief visits to Charlottesville, Va., there to advise with Mr. D. I. Bushnell, jr., in those investigations of nearby Indian village sites he is pursuing in behalf of the bureau.

EDITORIAL WORK AND PUBLICATIONS

The editing of the publications of the bureau was continued through the year by Mr. Stanley Searles, editor, assisted by Mrs. Frances S. Nichols, editorial assistant. The status of the publications is presented in the following summary.

PUBLICATIONS ISSUED

- Bulletin 88. Myths and Tales of the Southeastern Indians. (Swanton). x+275 pp.
- Bulletin 90. Papago Music (Densmore). xx+229 pp. 19 pls. 4 figs.
- Bulletin 91. Additional Studies of the Arts, Crafts, and Customs of the Guiana Indians (Roth). xvii+110 pp. 34 pls. 90 figs.
- Bulletin 93. Pawnee Music (Densmore). xviii+129 pp. 8 pls.
- Bulletin 95. Contributions to Fox Ethnology—II (Michelson). vii+183 pp. 1 fig.
- List of Publications of the Bureau of American Ethnology. 50 pp.

PUBLICATIONS IN PRESS

- Forty-fifth Annual Report. Accompanying papers: The Salishan Tribes of the Western Plateaus (Teit, edited by Boas); Tattooing and Face and Body Painting of the Thompson Indians, British Columbia (Teit, edited by Boas); The Ethnobotany of the Thompson Indians of British Columbia (Steedman); The Osage Tribe: Rite of the Wa-xó-be (La Flesche).
- Forty-sixth Annual Report. Accompanying papers: Anthropological Survey in Alaska (Hrdlicka); Report to the Hon. Isaac S. Stevens, Governor of Washington Territory, on the Indian Tribes of the Upper Missouri (Denig, edited by Hewitt).
- Bulletin 94. Tobacco among the Karuk Indians of California (Harrington).
- Bulletin 96. Early Pueblo Ruins in the Piedra District, Southwestern Colorado (Roberts).

DISTRIBUTION OF PUBLICATIONS

The distribution of the publications of the bureau has been continued under the charge of Miss Helen Munroe, assisted by Miss Emma B. Powers. Publications distributed were as follows:

Report volumes and separates.....	3, 938
Bulletins and separates.....	20, 242
Contributions to North American Ethnology.....	40
Miscellaneous publications.....	648
Total.....	24, 868

As compared with the fiscal year ended June 30, 1929, there was an increase of 4,756 publications distributed, due in part to the large number of separates from the Handbook of American Indians sent to Camp Fire Girls. After revision, the mailing list now stands at 1,627.

ILLUSTRATIONS

Following is a summary of work accomplished in the illustration branch of the bureau under the supervision of Mr. DeLancey Gill, illustrator:

Photographs retouched, lettered, and otherwise made ready for engraving.....	1, 638
Drawings prepared, including maps, charts, etc.....	32
Engravers' proofs criticized.....	742

Printed editions of colored plates examined at Government Printing Office.....	31,500
Correspondence attended to (letters).....	210
Photographs selected and catalogued for private publishers.....	314
Photo-laboratory work by Dr. A. J. Olmsted, National Museum, in cooperation with the Bureau of American Ethnology:	
Negatives.....	84
Prints.....	253
Lantern slides.....	23

LIBRARY

The reference library has continued under the care of Miss Ella Leary, librarian, assisted by Mr. Thomas Blackwell.

The library consists of 29,071 volumes, about 16,527 pamphlets, and several thousand unbound periodicals. During the year 559 books were accessioned, of which 109 were acquired by purchase and 450 by gift and exchange; also 150 pamphlets, and 4,106 serials, chiefly the publications of learned societies, were received and recorded, of which 110 were obtained by purchase, the remainder being received through exchange. The catalogue was increased by the addition of 3,420 cards. Volumes to the number of 210 were collated and prepared for binding. Numerous loans were made to libraries in Washington, and a considerable amount of reference work was done in the usual course of the library's service to investigators and students, both those in the Smithsonian Institution and others. The purchase of books and periodicals for the library has been restricted to such as relate to the bureau's researches.

Many volumes received by the library not pertaining to anthropology were transferred to the library of the Smithsonian Institution. During the year the cataloguing has been carried on as new accessions were acquired and good progress was made in cataloguing ethnologic and related articles in the earlier serials. The number of books borrowed from the Library of Congress for the use of the staff of the bureau in prosecuting their researches was about 150.

COLLECTIONS

Accession No.

107862. Archaic black and white bowl collected by Doctor Fewkes from Far View House, Mesa Verde, in 1921, and fragment of ancient Zuñi pottery from Canyon del Muerto, Ariz., collected by Dr. W. H. Spinks. (2 specimens.)
107866. Blackberrying basket made by Mrs. Ascensión Solórsano, a San Juan Indian, and collected by J. P. Harrington in 1929. (1 specimen.)
109074. Flint hammerstone presented to the bureau by J. D. Howard; cast of an engraved bone gorget sent by E. M. Graves; and a Chinese basket. (3 specimens.)

Accession No.

109788. Smoking pipe or cigarette made of anis by the San Juan Indians, San Benito County, Calif., and collected by J. P. Harrington. (1 specimen.)
110111. Cast of a "cogged" stone from the ranch of Mrs. Newland of Huntington Beach, Los Angeles, Calif., and presented to the bureau by S. C. Evans. (1 specimen.)
110113. Decorated elk-skin pouch made by Fritz Hanson, a Karuk Indian of Somesbar, Siskiyou Co., Calif., and purchased from him by the bureau. (1 specimen.)
110319. Archeological material collected in 1928 by Dr. F. H. H. Roberts, jr., from early Pueblo ruins in the Piedra District, Archuleta Co., southwest Colorado. (477 specimens.)

PROPERTY

Office equipment was purchased to the amount of \$64.78.

MISCELLANEOUS

The correspondence and other clerical work of the office has been conducted by Miss May S. Clark, clerk to the chief, assisted by Mr. Anthony W. Wilding, clerk. Miss Mae W. Tucker, stenographer, was engaged in completing the catalogue of phonograph records of Indian music, copying manuscripts for Doctor Swanton and in assisting Mr. Hewitt in his work as custodian of manuscripts and phonograph records. Mrs. Frances S. Nichols assisted the editor.

During the course of the year information was furnished by members of the staff in reply to numerous inquiries concerning the North American Indian peoples, both past and present, and the Mexican peoples of the prehistoric and early historic periods to the south. Various specimens sent to the bureau were identified and data on them furnished for their owners.

Personnel—Dr. Francis LaFlesche retired as ethnologist of the bureau December 26, 1929.

Respectfully submitted.

M. W. STIRLING, *Chief.*

Dr. C. G. ABBOT,

Secretary, Smithsonian Institution.

APPENDIX 5

REPORT ON THE INTERNATIONAL EXCHANGE SERVICE

SIR: I have the honor to submit the following report on the operations of the International Exchange Service during the fiscal year ending June 30, 1930:

For the support of the system of International Exchanges Congress appropriated \$51,297, an increase of \$942 over the amount granted for the preceding year. This extra amount was requested to cover the added cost for freight due to the increase in the weight of shipments sent abroad. The repayments from governmental and other establishments aggregated \$5,050.30, making the total resources available for carrying on the Exchange Service during 1930, \$56,347.30.

The total number of packages received both from domestic and foreign sources for distribution through the service was 694,665, an increase over the previous year of 74,180, or about 12 per cent. The weight of these packages was 708,094 pounds, a gain of 86,721 pounds, or nearly 14 per cent. These increases are quite out of the ordinary, especially when it is considered that the gain in packages during the preceding year was one of the largest in the history of the service.

The publications sent and received by the Exchange Service are classified as parliamentary documents, departmental documents, and miscellaneous scientific and literary publications. The term "Parliamentary documents," as here used, refers to publications set aside by law for exchange with foreign governments, and includes not only documents printed by order of either House of Congress, but those issued by any department, bureau, or commission of the Government not of a confidential nature. The returns for these publications are deposited in the Library of Congress. The term "Departmental documents" embraces all of the publications delivered at the Institution from the various Government departments, bureaus, or commissions, for distribution to correspondents abroad from whom they desire to obtain similar publications in exchange. The "Miscellaneous scientific and literary publications" are received chiefly from learned societies, universities, colleges, scientific organizations, and museums. The number and weight of packages coming under these different headings are as follows:

	Packages		Weight	
	Sent	Received	Sent	Received
United States parliamentary documents sent abroad.....	298, 833		<i>Pounds</i> 134, 829	<i>Pounds</i>
Publications received in return for parliamentary documents.....		13, 511		35, 597
United States departmental documents sent abroad.....	196, 917		185, 394	
Publications received in return for departmental documents.....		7, 079		25, 065
Miscellaneous scientific and literary publications sent abroad.....	127, 166		217, 890	
Miscellaneous scientific and literary publications received from abroad for distribution in the United States.....		51, 159		109, 319
Total.....	622, 916	71, 749	538, 113	169, 981
Grand total.....	694, 665		708, 094	

It will be seen from the foregoing table that 74 per cent of the work of the office has been conducted in behalf of the United States governmental establishments.

There were shipped abroad during the year 3,235 boxes, being an increase of 412 (14.6 per cent) over the number for the preceding 12 months. This is the largest number of boxes forwarded abroad through the service in one year. These boxes measured a total of 17,034 cubic feet. Seven hundred and eighty-five of the boxes contained full sets of United States official documents for authorized depositories and the remainder (2,450) were filled with departmental and other publications for depositories of partial sets and for miscellaneous correspondents. The number of boxes sent to each country is given below:

Consignments of exchanges forwarded to foreign countries

Country	Number of boxes	Country	Number of boxes
Argentina.....	71	Japan.....	90
Austria.....	63	Latvia.....	26
Belgium.....	72	Mexico.....	13
Bolivia.....	3	Netherlands.....	84
Brazil.....	53	New South Wales.....	37
British Colonies.....	29	New Zealand.....	41
Bulgaria.....	9	Norway.....	55
Canada.....	52	Palestine.....	107
Chile.....	33	Paraguay.....	2
China.....	76	Peru.....	27
Colombia.....	28	Poland.....	49
Costa Rica.....	32	Portugal.....	27
Cuba.....	13	Queensland.....	28
Czechoslovakia.....	68	Rumania.....	26
Danzig.....	2	Russia.....	150
Denmark.....	48	Siam.....	4
Ecuador.....	8	South Australia.....	27
Egypt.....	25	Spain.....	44
Estonia.....	27	Sweden.....	98
Finland.....	18	Switzerland.....	93
France.....	197	Tasmania.....	22
Germany.....	376	Turkey.....	13
Great Britain and Ireland.....	390	Union of South Africa.....	54
Greece.....	4	Uruguay.....	28
Haiti.....	3	Venezuela.....	24
Honduras.....	2	Victoria.....	74
Hong Kong.....	1	Western Australia.....	26
Hungary.....	43	Yugoslavia.....	29
India.....	73		
Italy.....	118	Total.....	3, 235

In addition to the packages forwarded abroad in boxes, 67,945—an increase over last year of 7,089—were sent to their destinations direct by mail. About one-third of these packages contained copies of the daily issue of the Congressional Record, which, under treaty stipulations and by authority of Congress, are mailed directly to the depositories immediately upon publication. The remainder of the packages were partly for remote places which could not be reached through existing agencies and partly for countries for which the accumulations were so small at the scheduled forwarding dates that it was more economical to send them by mail than by freight.

Almost since the establishment of the Smithsonian system of exchanges in 1850, consignments received from abroad have, at the request of the Institution, been addressed in care of the collector of customs at the port of New York, consignments so addressed being admitted duty free and without examination. Up to July 1, 1923, an official of the United States customhouse attended to the entry and transmission to Washington of shipments arriving at the port of New York for the Smithsonian Institution. On that date the coordinator of the second area assumed charge of the handling of all shipments for the Institution, both incoming and outgoing. However, as the foreign agencies had for so many years been accustomed to addressing boxes to the Institution in care of the Collector of Customs, no change in that regard was made until shortly before the close of the current fiscal year, when the various foreign exchange bureaus were requested to address all future shipments to the Institution as follows:

SMITHSONIAN INSTITUTION,
Washington, D. C.
Care Coordinator, Second Area,
Customhouse, New York City, U. S. A.

During the year nine boxes of exchanges from Germany were destroyed when the steamship *München* sunk while unloading at her pier in New York, the sinking of the vessel having been caused by an explosion which resulted in a fire. These boxes contained publications for distribution to various addresses in the United States and German patent specifications for the United States Patent Office, Boston Public Library, Chicago Public Library, and St. Louis Public Library. An effort is being made to obtain duplicate copies of the lost publications.

As an example of the use made of the facilities of the International Exchange Service other than in transporting packages, reference is made to a request from Adelbert College Library, Cleveland, Ohio, for information concerning the Bulletin of Works published by the Station of Aquiculture and Fisheries of Castiglione, a communication regarding the matter addressed to the station itself by the

library not having received attention. Full information was obtained by this office through the French Exchange Bureau, and in the library's letter of acknowledgment to the Institution it is stated that "the information, which had been impossible for us to obtain, is just what we need"

FOREIGN DEPOSITORIES OF GOVERNMENTAL DOCUMENTS

A convention for the international exchange of official documents and scientific and literary publications was concluded at Brussels March 15, 1886, between the United States and certain other countries. In accordance with the terms of that convention and under authority of resolutions of Congress setting apart a certain number of documents for exchange with foreign governments, there now are sent regularly to depositories abroad 62 full sets of United States official publications and 47 partial sets, an increase of four sets during the year. China, Assam, Bihar and Orissa, Central Provinces, and the Punjab were added to the list of those countries receiving partial sets, and the set sent to Lourenço Marquez was discontinued.

The depository in Austria has been changed from the Bundesamt für Statistik to the Bundeskanzleramt, Herrengasse 23, Vienna I; the one in Bolivia from the Ministerio de Colonización y Agricultura to the Biblioteca del H. Congreso Nacional, La Paz; the one in Hesse, Germany, from the Landesbibliothek, Darmstadt, to the Universitäts-Bibliothek, Giessen; and the one in Honduras from the Ministerio de Relaciones Exteriores to the Biblioteca y Archivo Nacionales, Tegucigalpa.

A complete list of the foreign depositories of governmental documents is given below:

DEPOSITORIES OF FULL SETS

ARGENTINA: Ministerio de Relaciones Exteriores, Buenos Aires.

BUENOS AIRES: Biblioteca de la Universidad Nacional de La Plata, La Plata. (Depository of the Province of Buenos Aires.)

AUSTRALIA: Library of the Commonwealth Parliament, Canberra.

NEW SOUTH WALES: Public Library of New South Wales, Sydney.

QUEENSLAND: Parliamentary Library, Brisbane.

SOUTH AUSTRALIA: Parliamentary Library, Adelaide.

TASMANIA: Parliamentary Library, Hobart.

VICTORIA: Public Library of Victoria, Melbourne.

WESTERN AUSTRALIA: Public Library of Western Australia, Perth.

AUSTRIA: Bundeskanzleramt, Herrengasse 23, Vienna I.

BELGIUM: Bibliothèque Royale, Brussels.

BRAZIL: Bibliotheca Nacional, Rio de Janeiro.

CANADA: Library of Parliament, Ottawa.

MANITOBA: Provincial Library, Winnipeg.

ONTARIO: Legislative Library, Toronto.

QUEBEC: Library of the Legislature of the Province of Quebec, Quebec.

CHILE: Biblioteca del Congreso Nacional, Santiago.

CHINA: Ministry of Foreign Affairs, Nanking.

COLOMBIA: Biblioteca Nacional, Bogotá.

COSTA RICA: Oficina de Depósito y Canje Internacional de Publicaciones, San José.

CUBA: Secretaría de Estado (Asuntos Generales y Canje Internacional), Habana.

CZECHOSLAVAKIA: Bibliothéque de l'Assemblée Nationale, Prague.

DENMARK: Kongelige Bibliotheket, Copenhagen.

EGYPT: Bureau des Publications, Ministère des Finances, Cairo.

ESTONIA: Riigiraamatukogu (State Library), Tallinn (Reval).

FRANCE: Bibliothéque Nationale, Paris.

PARIS: Préfecture de la Seine.

GERMANY: Reichstauschstelle im Reichsministerium des Innern, Berlin C 2.

BADEN: Universitäts-Bibliothek, Freiburg. (Depository of the State of Baden.)

BAVARIA: Bayerische Staatsbibliothek, Munich.

PRUSSIA: Preussische Staatsbibliothek, Berlin, N. W. 7.

SAXONY: Sächsische Landesbibliothek, Dresden—N. 6.

WURTEMBERG: Landesbibliothek, Stuttgart.

GREAT BRITAIN:

ENGLAND: British Museum, London.

GLASGOW: City Librarian, Mitchell Library, Glasgow.

LONDON: London School of Economics and Political Science. (Depository of the London County Council.)

GREECE: Shipments temporarily suspended.

HUNGARY: Hungarian House of Delegates, Budapest.

INDIA: Imperial Library, Calcutta.

IRISH FREE STATE: National Library of Ireland, Dublin.

ITALY: Ministero della Pubblica Istruzione, Rome.

JAPAN: Imperial Library of Japan, Tokyo.

LATVIA: Bibliothéque d'État, Riga.

MEXICO: Biblioteca Nacional, Mexico, D. F.

NETHERLANDS: Royal Library, The Hague.

NEW ZEALAND: General Assembly Library, Wellington.

NORTHERN IRELAND: Ministry of Finance, Belfast.

NORWAY: Universitets-Bibliotek, Oslo. (Depository of the Government of Norway.)

PERU: Biblioteca Nacional, Lima.

POLAND: Bibliothéque du Ministère des Affaires Étrangères, Warsaw.

PORTUGAL: Biblioteca Nacional, Lisbon.

RUMANIA: Academia Română, Bucharest.

RUSSIA: Shipments temporarily suspended.

SPAIN: Servicio del Cambio Internacional de Publicaciones, Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos, Madrid.

SWEDEN: Kungliga Bibliotheket, Stockholm.

SWITZERLAND: Bibliothéque Centrale Fédérale, Berne.

SWITZERLAND: Library of the League of Nations, Geneva.

TURKEY: Ministère de l'Instruction Publique, Angora.

UNION OF SOUTH AFRICA: State Library, Pretoria, Transvaal.

URUGUAY: Oficina de Canje Internacional de Publicaciones, Montevideo.

VENEZUELA: Biblioteca Nacional, Caracas.

YUGOSLAVIA: Ministère de l'Éducation, Belgrade.

DEPOSITORIES OF PARTIAL SETS

AUSTRIA :

VIENNA : Wiener Magistrat.

BOLIVIA : Biblioteca del H. Congreso Nacional, La Paz.

BRAZIL :

MINAS GERAES : Directoria Geral de Estatistica em Minas, Bello Horizonte, Minas Geraes.

RIO DE JANEIRO : Bibliotheca da Assembleia Legislativa do Estado, Nictheroy.

BRITISH GULANA : Government Secretary's Office, Georgetown, Demerara.

BULGARIA : Ministère des Affaires Étrangères, Sofia.

CANADA :

ALBERTA : Provincial Library, Edmonton.

BRITISH COLUMBIA : Legislative Library, Victoria.

NEW BRUNSWICK : Legislative Library, Fredericton.

NOVA SCOTIA : Provincial Secretary of Nova Scotia, Halifax.

PRINCE EDWARD ISLAND : Legislative Library, Charlottetown.

SASKATCHEWAN : Government Library, Regina.

CEYLON : Colonial Secretary's Office (Record Department of the Library), Colombo.

CHINA : National Library, Peiping.

DANZIG : Stadtbibliothek, Free City of Danzig.

DOMINICAN REPUBLIC : Biblioteca del Senado, Santo Domingo.

ECUADOR : Biblioteca Nacional, Quito.

FINLAND : Parliamentary Library, Helsingfors.

FRANCE :

ALSACE-LORRAINE : Bibliothèque Universitaire et Régionale de Strasbourg, Strasbourg.

GERMANY :

BREMEN : Senatskommission für Reichs- und Auswärtige Angelegenheiten.

HAMBURG : Senatskommission für Reichs- und Auswärtige Angelegenheiten.

HESSE : Universitäts-Bibliothek, Giessen.

-LÜBECK : President of the Senate.

THURINGIA : Rothenberg-Bibliothek, Landesuniversität, Jena.

GUATEMALA : Secretaria de Relaciones Exteriores de la República de Guatemala.

HAITI : Secrétaire d'État des Relations Extérieures, Port au Prince.

HONDURAS : Biblioteca y Archivo Nacionales, Tegucigalpa.

ICELAND : National Library, Reykjavik.

INDIA :

ASSAM : General and Judicial Department, Shillong.

BIHAR and ORISSA : Revenue Department, Patna.

BOMBAY : Undersecretary to the Government of Bombay, General Department, Bombay.

BURMA : Secretary to the Government of Burma, Education Department, Rangoon.

CENTRAL PROVINCES : General Administration Department, Nagpur.

MADRAS : Chief Secretary to the Government of Madras, Public Department, Madras.

PUNJAB : Chief Secretary to the Government of the Punjab, Lahore.

UNITED PROVINCES OF AGRA AND OUDH : University of Allahabad, Allahabad.

JAMAICA : Colonial Secretary, Kingston.

LIBERIA : Department of State, Monrovia.

LITHUANIA: Ministère des Affaires Étrangères, Kaunas (Kovno).

MALTA: Minister for the Treasury, Valetta.

NEWFOUNDLAND: Colonial Secretary, St. Johns.

NICARAGUA: Superintendente de Archivos Nacionales, Managua.

PANAMA: Secretaría de Relaciones Exteriores, Panama.

PARAGUAY: Sección Canje Internacional de Publicaciones del Ministerio de Relaciones Exteriores, Estrella, 563, Asunción.

SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.

SIAM: Department of Foreign Affairs, Bangkok.

STRAITS SETTLEMENTS: Colonial Secretary, Singapore.

INTERPARLIAMENTARY EXCHANGE OF THE OFFICIAL JOURNAL

In 1909 Congress, in order to more fully carry into effect the provisions of the exchange convention concluded at Brussels in 1886, passed a resolution setting aside a certain number of copies of the daily issue of the Congressional Record for exchange, through the Smithsonian Institution, with such foreign governments as may agree to send to the United States current copies of their parliamentary record or like publication, the returns to be deposited in the Library of Congress. Since the passage of that resolution many countries have entered into this exchange, 102 copies of the Record now being sent abroad, one new depository—Colonial Secretary, Belize, British Honduras—having been added during the year.

The depositories of the Record in San José, Costa Rica; Port-au-Prince, Haiti; and Belgrade, Yugoslavia, have been discontinued and the following have been added: "A Federação," Porto Alegre, Brazil; Ufficio degli Studi Legislativi, Rome, Italy; Library of the Persian Parliament, Teheran, Persia. The depository in Madrid, Spain has been changed to Biblioteca del Congreso Nacional.

A complete list of the States taking part in this immediate exchange, together with the names of the establishments to whom the Record is mailed, is given below:

DEPOSITORIES OF CONGRESSIONAL RECORD

ARGENTINA:

Biblioteca del Congreso Nacional, Buenos Aires.

Cámara de Diputados, Oficina de Información Parlamentaria, Buenos Aires.

Buenos Aires: Biblioteca del Senado de la Provincia de Buenos Aires, La Plata.

AUSTRALIA:

Library of the Commonwealth Parliament, Canberra.

New South Wales: Library of Parliament of New South Wales, Sydney.

Queensland: Chief Secretary's Office, Brisbane.

Western Australia: Library of Parliament of Western Australia, Perth.

AUSTRIA: Bibliothek des Nationalrates, Vienna I.

BELGIUM: Bibliothèque de la Chambre des Représentants, Brussels.

BOLIVIA: Biblioteca del H. Congreso Nacional, La Paz.

BRAZIL:

- Bibliotheca do Congresso Nacional, Rio de Janeiro.
 Amazonas: Archivo, Bibliotheca e Imprensa Publica, Manãos.
 Bahia: Governador do Estado de Bahia, São Salvador.
 Espírito Santo: Presidencia do Estado do Espírito Santo, Victoria.
 Rio Grande do Sul: "A Federação," Porto Alegre.
 Sergipe: Director da Imprensa Official, Aracaju.
 São Paulo: Diario Official do Estado de São Paulo, São Paulo.

BRITISH HONDURAS: Colonial Secretary, Belize.

CANADA:

- Library of Parliament, Ottawa.
 Clerk of the Senate, Houses of Parliament, Ottawa.

CHINA: National Library, Pei Hai, Peking.

CUBA:

- Biblioteca de la Cámara de Representantes, Habana.
 Biblioteca del Senado, Habana.

CZECHOSLOVAKIA: Bibliothèque de l'Assemblée Nationale, Prague.

DANZIG: Stadtbibliothek, Danzig.

DENMARK: Rigsdagens Bureau, Copenhagen.

DOMINICAN REPUBLIC: Biblioteca del Senado, Santo Domingo.

DUTCH EAST INDIES: Volksraad von Nederlandsch-Indië, Batavia, Java.

EGYPT: Bureau des Publications, Ministère des Finances, Cairo.

ESTONIA: Riigiraamatukogu (State Library), Tallinn (Reval).

FRANCE:

- Chambre des Députés, Service de l'Information Parlementaire Étrangère,
 Paris.
 Bibliothèque du Sénat, au Palais du Luxembourg, Paris.

GERMANY:

- Deutsche Reichstags-Bibliothek, Berlin, N. W. 7.
 Anhalt: Anhaltische Landesbücherei, Dessau.
 Baden: Universitäts-Bibliothek, Heidelberg.
 Braunschweig: Bibliothek des Braunschweigischen Staatsministeriums,
 Braunschweig.
 Mecklenburg-Schwerin: Staatsministerium, Schwerin.
 Mecklenburg-Strelitz: Finanzdepartement des Staatsministeriums, Neu-
 strelitz.
 Oldenburg: Oldenburgisches Staatsministerium, Oldenburg i. O.
 Prussia: Bibliothek des Abgeordnetenhauses, Prinz-Albrechtstrasse 5,
 Berlin, S. W. 11.
 Schaumburg-Lippe: Schaumburg-Lippische Landesregierung, Bückeburg.

GIBRALTAR: Gibraltar Garrison Library Committee, Gibraltar.

GREAT BRITAIN: Library of the Foreign Office, London.

GREECE: Library of Parliament, Athens.

GUATEMALA: Archivo General del Gobierno, Guatemala.

HONDURAS: Biblioteca del Congreso Nacional, Tegucigalpa.

HUNGARY: Bibliothek des Abgeordnetenhauses, Budapest.

INDIA: Legislative Department, Simla.

ITALY:

- Biblioteca della Camera dei Deputati, Rome.
 Biblioteca del Senato del Regno, Rome.
 Ufficio degli Studi Legislativi, Santo del Regno, Rome.

IRAQ: Chamber of Deputies, Baghdad, Iraq (Mesopotamia).

IRISH FREE STATE: Dail Eireann, Dublin.

LATVIA: Library of the Saeima, Riga.

LIBERIA: Department of State, Monrovia.

MEXICO: Secretaría de la Cámara de Diputados, Mexico, D. F.

Aguascalientes: Gobernador del Estado de Aguascalientes, Aguascalientes.

Campeche: Gobernador del Estado de Campeche, Campeche.

Chihuahua: Gobernador del Estado de Chihuahua, Chihuahua.

Chiapas: Gobernador del Estado de Chiapas, Tuxtla Gutierrez.

Coahuila: Periódico Oficial del Estado de Coahuila, Palacio de Gobierno, Saltillo.

Colima: Gobernador del Estado de Colima, Colima.

Durango: Gobernador Constitucional del Estado de Durango, Durango.

Guanajuato: Secretaría General de Gobierno del Estado, Guanajuato.

Guerrero: Gobernador del Estado de Guerrero, Chilpancingo.

Jalisco: Biblioteca del Estado, Guadalajara.

Lower California: Gobernador del Distrito Norte, Mexicali, B. C., Mexico.

Mexico: Gaceta del Gobierno, Toluca, Mexico.

Michoacán: Secretaría General de Gobierno del Estado de Michoacán, Morelia.

Morelos: Palacio de Gobierno, Cuernavaca.

Nayarit: Gobernador de Nayarit, Tepic.

Nuevo León: Biblioteca del Estado, Monterey.

Oaxaca: Periódico Oficial, Palacio de Gobierno, Oaxaca.

Puebla: Secretaría General de Gobierno, Zaragoza.

Queretaro: Secretaría General de Gobierno, Sección de Archivo, Queretaro.

San Luis Potosí: Congreso del Estado, San Luis Potosí.

Sinaloa: Gobernador del Estado de Sinaloa, Culiacan.

Sonora: Gobernador del Estado de Sonora, Hermosillo.

Tabasco: Secretaría General de Gobierno, Sección 3a, Ramo de Prensa, Villahermosa.

Tamaulipas: Secretaría General de Gobierno, Victoria.

Tlaxcala: Secretaría de Gobierno del Estado, Tlaxcala.

VERA CRUZ: Gobernador del Estado de Vera Cruz, Departamento de Gobernación y Justicia, Jalapa.

Yucatán: Gobernador del Estado de Yucatán, Mérida, Yucatán.

NEW ZEALAND: General Assembly Library, Wellington.

NORWAY: Stortingets Bibliothek, Oslo.

PERSIA: Library of the Persian Parliament, Téhéran.

PERU: Cámara de Diputados, Congreso Nacional, Lima.

POLAND: Ministère des Affaires Étrangères, Warsaw.

PORTUGAL: Biblioteca do Congresso da Republica, Lisbon.

RUMANIA:

Bibliothèque de la Chambre des Députés, Bucharest.

Ministère des Affaires Étrangères, Bucharest.

SPAIN:

Biblioteca del Congreso Nacional, Madrid.

Barcelona: Biblioteca de la Comisión Permanente Provincial de Barcelona, Barcelona.

SWITZERLAND:

Bibliothèque de l'Assemblée Fédérale Suisse, Berne.

Library of the League of Nations, Geneva.

SYRIA:

Ministère des Finances de la République Libanaise, Service du Matériel,
Beirut.

Governor of the State of Alaouites, Lattaquié.

TURKEY: Turkish Grand National Assembly, Angora.

UNION OF SOUTH AFRICA:

Library of Parliament, Cape Town, Cape of Good Hope.

State Library, Pretoria, Transvaal.

URUGUAY: Biblioteca de la Cámara de Representantes, Montevideo.

VENEZUELA: Cámara de Diputados, Congreso Nacional, Carácas.

FOREIGN EXCHANGE AGENCIES

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LIST OF EXCHANGE AGENCIES

ALGERIA, via France.

ANGOLA, via Portugal.

ARGENTINA: Comisión Protectora de Bibliotecas Populares, Calle Córdoba 931,
Buenos Aires.

AUSTRIA: Internationale Austauschstelle, Bundeskanzleramt, Herrengasse 23,
Vienna I.

AZORES, via Portugal.

BELGIUM: Service Belge de Échanges Internationaux, Rue des Longs-Chariots,
46, Brussels.

BOLIVIA: Oficina Nacional de Estadística, La Paz.

BRAZIL: Serviço de Permutações Internacionais, Bibliotheca Nacional, Rio de
Janeiro.

BRITISH COLONIES: Crown Agents for the Colonies, London.

BRITISH GUIANA: Royal Agricultural and Commercial Society, Georgetown.

BRITISH HONDURAS: Colonial Secretary, Belize.

BULGARIA: Institutions Scientifiques de S. M. le Roi de Bulgarie, Sofia.

CANARY ISLANDS, via Spain.

CHILE: Servicio de Canjes Internacionales, Biblioteca Nacional, Santiago.

CHINA: Bureau of International Exchange, Academia Sinica, 205 Avenue du
Roi Albert, Shanghai.

COLOMBIA: Oficina de Canjes Internacionales y Reparto, Biblioteca Nacional,
Bogotá.

COSTA RICA: Oficina de Depósito y Canje Internacional de Publicaciones, San
José.

CZECHOSLOVAKIA: Service Tchecoslovaque des Échanges Internationaux, Biblio-
thèque de l'Assemblée Nationale, Prague 1-79.

DANZIG: Amt für den Internationalen Schriftenaustausch der Freien Stadt
Danzig, Stadtbibliothek, Danzig.

DENMARK: Service Danois des Échanges Internationaux, Kongelige Danske
Videnskabernes Selskab, Copenhagen.

DUTCH GUIANA: Surinaamsche Koloniale Bibliotheek, Paramaribo.

ECUADOR: Ministerio de Relaciones Exteriores, Quito.

- EGYPT: Bureau des Publications, Ministère des Finances, Cairo.
- ESTONIA: Riigiraamatukogu (State Library), Tallinn (Reval).
- FINLAND: Delegation of the Scientific Societies of Finland, Helsingfors.
- FRANCE: Service Français des Échanges Internationaux, 110 Rue de Grenelle, Paris.
- GERMANY: Amerika-Institut, Universitätstrasse 8, Berlin, N. W. 7.
- GREAT BRITAIN AND IRELAND: MESSRS. Wheldon & Wesley, 2, 3, and 4 Arthur St., New Oxford St., London W. C. 2.
- GREECE: Bibliothèque Nationale, Athens.
- GREENLAND, via Denmark.
- GUATEMALA: Instituto Nacional de Varones, Guatemala.
- HAITI: Secrétaire d'État des Relations Extérieures, Port-au-Prince.
- HONDURAS: Biblioteca Nacional, Tegucigalpa.
- HUNGARY: Hungarian Libraries Board, Budapest, IV.
- ICELAND, via Denmark.
- INDIA: Superintendent of Stationery, Bombay.
- ITALY: R. Ufficio degli Scambi Internazionali, Ministero della Pubblica Istruzione, Rome.
- JAMAICA: Institute of Jamaica, Kingston.
- JAPAN: Imperial Library of Japan, Tokyo.
- JAVA, via Netherlands.
- KOREA: Government General, Seoul.
- LATVIA: Service des Échanges Internationaux, Bibliothèque d'État de Lettonie, Riga.
- LIBERIA: Bureau of Exchanges, Department of State, Monrovia.
- LITHUANIA: Sent by mail.
- LOUBENÇO MARQUEZ, via Portugal.
- LUXEMBURG, via Belgium.
- MADAGASCAR, via France.
- MADEIRA, via Portugal.
- MOZAMBIQUE, via Portugal.
- NETHERLANDS: International Exchange Bureau of the Netherlands, Royal Library, The Hague.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- NEW ZEALAND: Dominion Museum, Wellington.
- NICARAGUA: Ministerio de Relaciones Exteriores, Managua.
- NORWAY: Service Norvégien des Échanges Internationaux, Bibliothèque de l'Université Royale, Oslo.
- PALESTINE: Hebrew University Library, Jerusalem.
- PANAMA: Sent by mail.
- PARAGUAY: Sección Canje Internacional de Publicaciones del Ministerio de Relaciones Exteriores, Estrella 563, Asuncion.
- PERU: Oficina de Reparto, Depósito y Canje Internacional de Publicaciones, Ministerio de Fomento, Lima.
- POLAND: Service Polonais des Échanges Internationaux, Bibliothèque du Ministère des Affaires Etrangères, Warsaw.
- PORTUGAL: Secção de Trocas Internacionas, Biblioteca Nacional, Lisbon.
- QUEENSLAND: Bureau of Exchanges of International Publications, Chief Secretary's Department, Brisbane.
- RUMANIA: Bureau des Échanges Internationaux, Institut Météorologique Central, Bucharest.
- RUSSIA: Academy of Sciences, Leningrad.
- SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.

- SIAM: Department of Foreign Affairs, Bangkok.
- SOUTH AUSTRALIA: South Australian Government Exchanges Bureau, Government Printing and Stationery Office, Adelaide.
- SPAIN: Servicio del Cambio Internacional de Publicaciones, Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos, Madrid.
- SUMATRA, via Netherlands.
- SWEDEN: Kongliga Svenska Vetenskaps Akademien, Stockholm.
- SWITZERLAND: Service Suisse des Échanges Internationaux, Bibliothèque Centrale Fédérale, Berne.
- SYRIA: American University of Beirut.
- TASMANIA: Secretary to the Premier, Hobart.
- TRINIDAD: Royal Victoria Institute of Trinidad and Tobago, Port-of-Spain.
- TUNIS, via France.
- TURKEY: Robert College, Constantinople.
- UNION OF SOUTH AFRICA: Government Printing Works, Pretoria, Transvaal.
- URUGUAY: Oficina de Canje Internacional de Publicaciones, Montevideo.
- VENEZUELA: Biblioteca Nacional, Caracas.
- VICTORIA: Public Library of Victoria, Melbourne.
- WESTERN AUSTRALIA: Public Library of Western Australia, Perth.
- YUGOSLAVIA: Ministère des Affaires Étrangères, Belgrade.

Mrs. Lucy C. Boehmer, who was retired in March last after having served for 34 years in the International Exchange Service, died July 2, 1930. She was the widow of George H. Boehmer, formerly chief clerk of the Exchange Service.

Respectfully submitted.

C. W. SHOEMAKER,

Chief Clerk, International Exchange Service.

DR. CHARLES G. ABBOT,

Secretary, Smithsonian Institution.

APPENDIX 6

REPORT ON THE NATIONAL ZOOLOGICAL PARK

SIR: I have the honor to submit the following report on the operations of the National Zoological Park for the fiscal year ending June 30, 1930:

The regular appropriation made by Congress for the maintenance of the park was \$203,000, an increase of \$7,450 over 1929. In addition an appropriation of \$220,000 was provided for the construction of a reptile house. The completion of this building has been made possible by the addition of \$28,000 to the regular 1931 appropriation. The first deficiency act provided \$2,000 for the construction of a gate to close at night a new road leading into the south portion of the park by Rock Creek.

On February 8, 1930, the Zoo suffered a severe loss in the death of Mr. A. B. Baker, who for more than 39 years had been assistant director. To Mr. Baker's great loyalty as well as his profound knowledge of zoological park management is due to a large extent the development of the National Zoological Park. His death takes away not only a good friend but a most valued official. He was succeeded by Mr. Ernest P. Walker, formerly senior biologist of the Biological Survey, who had recently been engaged in the game and bird reservation work conducted by that bureau.

ACCESSIONS

Gifts.—The collection this year has been greatly benefited by gifts, some of them of rare and unusual specimens obtained on expeditions.

Dr. Paul Bartsch brought home with him from South America and the West Indies 6 iguanas, 10 South American tortoises, and 50 hermit crabs.

Mr. Fred Carnochan, of New York, returned from East Africa with a rare white-thighed colobus, a Schwineforth chimpanzee, and a Killimbira guenon. This last was obtained from M. de Freygang of Urundi, and is the first of its kind to be exhibited in the United States.

Mr. Stephen Haweis brought from Dominica four giant toads and half a dozen large edible frogs of this island, locally called "mountain chickens."

Dr. H. C. Kellers, United States Navy, who accompanied the astronomical expedition to the Philippines, returned with a large shipment of snakes, lizards, birds, and small mammals.

Mr. W. M. Perrygo of the United States National Museum, on an expedition to Haiti, secured a large collection, of which six rhinoceros iguanas and two Haitian boas were the most interesting to the Zoo, though some of the small snakes that he collected may prove to be new species.

Hon. Gifford Pinchot, who cruised the Pacific on a notable expedition, brought home with him for the National Zoological Park a specimen of the almost extinct Duncan Island tortoise, a Hood Island tortoise, four Albemarle tortoises, and three land iguanas, all from the Galapagos. These are very important additions and make the collection of giant tortoises one of the finest.

Through Theodore Roosevelt, jr., Harold S. Coolidge, jr., and Ralph Wheeler, of the Kelly-Roosevelt expedition, were presented a trio of white-faced gibbons, father, mother, and child, all magnificent specimens; a rare Bay Bamboo rat; a sun bear; a Himalayan bear; as well as several smaller specimens.

Mr. Foster H. Benjamin of the United States Department of Agriculture, who has been engaged in field work in connection with the extermination of the fruit fly in Florida, has kept a constant lookout for reptiles, and through him there has been obtained a notable collection of Florida species, including many desirable specimens.

Mr. O. Hallson, Bethel, Alaska, through the Alaska Game Commission and the United States Biological Survey, sent three pairs of the rare Emperor goose, and Mr. E. R. Kalmbach of the United States Biological Survey secured on a western trip a collection of 31 assorted birds, including 5 Caspian terns.

The United Fruit Co., through Mr. Samuel Kress of Costa Rica, has continued its interest and presented a fine pair of Costa Rican deer, a collared peccary, and an Imperial boa.

Through the Walter P. Chrysler fund was purchased a specimen of the very rare saddle-bill stork of West Africa, one of the most striking of living birds. This bird was captured by the Viennese explorer Weidholz, and was acclimatized in Vienna and afterwards in Nice.

DONORS

Mr. Eugene L. Abbott, Washington, D. C., alligator.

Mr. H. W. Armentrout, Washington, D. C., 6 opossums.

Dr. Paul Bartsch, National Museum, Washington, D. C., 6 iguanas, 10 tortoises, 50 hermit crabs.

Mr. Frank Bastiani, Washington, D. C., Cuban parrot.

Mr. D. F. Beale, Washington, D. C., ring-necked pheasant.

Mr. Foster H. Benjamin, Orlando, Fla., through United States Department of Agriculture, American "chameleon," 4 gopher tortoises, 2 chicken turtles, 4

Florida box turtles, 5 soft-shell turtles, Osceola snapping turtle, 2 pine snakes, worm lizard, indigo snake, 9 tree frogs, oak toad, 4 toads.

Mr. John L. Billman, Washington, D. C., horned lizard.

Mr. J. S. C. Boswell, Alexandria, Va., 2 copperheads, king snake, water snake.

Mrs. Anne I. Boyd, Washington, D. C., yellow-shouldered parrot.

Messrs. L. A. Branchaud, Havre de Grace, Md., and H. C. Oberholser, through United States Biological Survey, whistling swan.

Mr. John S. Burrows, Washington, D. C., white-throated capuchin.

Mrs. C. J. Caithness, Washington, D. C., grass paroquet.

Mr. F. G. Carnochan, New York City, white-thighed colobus, chimpanzee.

Mr. W. Chavous, Washington, D. C., black snake.

Mr. Charles M. Clark, Washington, D. C., canary.

Mr. Walter P. Chrysler, Detroit, Mich., saddle-bill stork, 2 viscachas, bell bird.

Mr. and Mrs. Campbell Church, jr., Seattle, Wash., 2 Sitka bears.

Mrs. D. M. Cole, Beloit, Wis., 3 flying squirrels.

Miss Jean Craighead, Chevy Chase, Md., turkey vulture.

Miss Mary Daly, Washington, D. C., gray fox.

Mr. A. H. Davis, Palmyra, Va., Cuban parrot.

Mr. Talbot Denmead, Washington, D. C., call duck.

Mrs. E. N. Dingley, Washington, D. C., red fox.

Mr. J. H. Dobbins, Washington, D. C., 2 woodchucks.

Mrs. Mary Dowling, Washington, D. C., sparrow hawk.

Major Albert F. Drake, Ashton, Md., goat.

Mrs. Herbert Elmore, Washington, D. C., coyote.

Mr. E. T. Evans, through United States Department of Agriculture, soft-shell turtle.

Miss Harriet A. Fellows, Washington, D. C., 2 painted turtles.

Franklin Park Zoo, Boston, Mass., water snake, boa.

M. de Freygang, Usambura, Urundi, Africa (through F. G. Carnochan) Kilimbira guenon.

Mr. A. L. Goolsbe, Washington, D. C., white-throated capuchin.

Mr. W. A. Graves, Richmond, Va., raccoon.

Mr. Walter Greene, Washington, D. C., titi monkey.

Gude Bros., Washington, D. C., 3 alligators.

Mr. O. Hallson, through Alaska Game Commission and United States Biological Survey, Bethel, Alaska, 6 Emperor geese.

Mr. Rodney Hart, Washington, D. C., flying squirrel.

Mr. R. Hartshorn, Washington, D. C., copperhead.

Mr. Stephen Haweis, Dominica, British West Indies, 4 giant toads, 7 Dominican frogs.

Mr. C. L. Head, Washington, D. C., 2 canaries.

Mr. Rush L. Holland, Washington, D. C., yellow-fronted parrot.

Mrs. Mary Hosick, Washington, D. C., double yellow-headed parrot.

Mr. Philip R. Hough, East Falls Church, Va., 4 box turtles, wood tortoise, common snapping turtle.

Mr. A. B. Howell, Baltimore, Md., Emperor boa.

Mr. J. A. Hyslop, jr., Silver Spring, Md., 2 copperheads, fence lizard, blue racer, black snake, 2 hog-nosed snakes.

Dr. H. H. T. Jackson, United States Biological Survey, 3 musk turtles, 10 ornate turtles.

Capt. John N. Johnson, Fort George G. Meade, Md., hog-nosed snake.

Mr. E. R. Kalmbach, United States Biological Survey, 3 California gulls, 7 ring-billed gulls, 5 caspian terns, 5 shovellers, 7 coots, 7 green-winged teals.

Dr. H. C. Kellers, United States Navy, 7 regal pythons, 2 Philippine water dragons, 4 Philippine monitors, 3 Philippine macaques, common jungle fowl, Malay Brahminy kite, 13 tangalunga and Philippine palm-civets, 12 bleeding-heart doves, 16 green-winged doves.

Mr. M. A. Kendall, Holtville, Calif., 2 tricolor ground snakes.

Mr. Jack Knauer, Washington, D. C., 11 opossums.

Mr. E. H. Kreh, Frederick, Md., copperhead.

Mr. Samuel Kress, through the United Fruit Co., Costa Rican deer, collared peccary, imperial boa.

Mr. C. D. Langdon, Washington, D. C., raccoon.

Mrs. F. S. Long, Washington, D. C., Cuban parrot.

Mr. John L. Magnus, Washington, D. C., ring-necked pheasant.

Mrs. McCormick-Goodhart, Hyattsville, Md., 2 cockatiels.

Mr. E. B. McLean, Friendship, D. C., 2 black mallards, call duck.

Mr. R. F. McMahon, Washington, D. C., 2 barn owls.

Mr. Bob McPherson, Johnny Jones Carnival, murine opossum.

Mr. F. Miller, Washington, D. C., garter snake.

Mr. Walter L. Mitchell, East Falls Church, Va., black Carolina vulture.

Mr. O. J. Murie, Jackson, Wyo., through United States Biological Survey, 7 Rocky Mountain jays, long crested jay.

Mr. M. E. Musgrave, Phoenix, Ariz., through United States Biological Survey, red racer.

Mr. Wilfred Nerlich, Washington, D. C., ferret.

Mr. E. S. Newman, Washington, D. C., ring-necked pheasant.

Mr. Harry Norment, Washington, D. C., double yellow-headed parrot.

Dr. A. Obele, Washington, D. C., 2 alligators.

Miss Frances Owen, Chevy Chase, D. C., 2 screech owls.

Mr. R. G. Paine, Washington, D. C., black snake.

Mrs. P. B. Parke, Chevy Chase, Md., 2 goldfinches.

Mr. W. M. Perrygo, National Museum, 6 green vine snakes, 3 Haitian boas, 2 garter snakes, 2 turtles, 6 rhinoceros iguanas, West Indian crocodile, West Indian tree duck, bobwhite, white-winged dove, West Indian dove, ground dove, red-shouldered hawk.

Mr. W. B. Pierce, Washington, D. C., alligator.

Hon. Gifford Pinchot, Washington, D. C., Duncan Island tortoise, Hood Island tortoise, 3 Galapagos iguanas, 4 Albemarle tortoises.

Mr. Lincoln Potter, Washington, D. C., 2 turkey vultures.

Mr. and Mrs. S. H. Rathbun, Washington, D. C., yellow and blue macaw.

Mrs. Mary Roberts Rinehart, Washington, D. C., white-throated capuchin.

Mr. W. H. Rogers, Liverpool, England, 2 New Guinea brown pigeons.

Messrs. Theodore Roosevelt, jr., Harold S. Coolidge, jr., and Ralph Wheeler (Kelly-Roosevelt expedition), 3 white-cheeked gibbons, 2 pig-tailed monkeys, 3 rhesus monkeys, sun bear, Himalayan bear, Bay bamboo rat.

Mr. C. M. Rose, Wheeling, W. V., yellow-shouldered parrot.

Mr. Walter Deane Rose, Washington, D. C., 3 horned lizards.

Mr. H. H. Rudolph, Washington, D. C., 2 ring-necked pheasants.

San Diego Zoological Society, San Diego, Calif., 2 rat kangaroos.

Mr. Helmar C. Schmidt, Eastport, Md., American crow.

Mr. A. P. Scott, Isle of Wight Co., Va., bald eagle.

Mr. P. E. Siggers, Washington, D. C., 100 white mice.

Mr. H. H. Shamel, Washington, D. C., woodchuck, 2 muskrats.

Mr. Raymond C. Shannon, National Museum, Washington, D. C., douroucoulis, squirrel monkey, yaguarundi.

- Mr. Robert Shosteck, Washington, D. C., pine skink.
 Mr. P. W. Shufeldt, Belize, British Honduras, Baird's tapir.
 Mr. G. T. Smallwood, Chevy Chase, D. C., Marine turtle.
 Mr. Donald Smith, Chevy Chase, Md., common snapping turtle.
 Commander Kirby Smith, United States Navy, 2 green-rumped parrotlets,
 Venezuelan parrot, 2 blue-winged paroquets.
 Mrs. J. L. Stafford, Washington, D. C., Cuban parrot.
 Mrs. M. Stallsmith, Kensington, Md., orange-fronted parrot.
 Mr. F. W. Steele, Charleston, W. Va., 6 opossums.
 Mr. Clifton Stone, Washington, D. C., 4 horned lizards.
 Mr. W. R. Tayloe, Fredericksburg, Va., plains wolf.
 Mr. Oliver Taylor, Washington, D. C., 2 alligators.
 Dr. J. P. Thomas, Miami, Fla., Philippine macaque.
 Misses Helen and Emily Thour, Washington, D. C., 2 alligators.
 Mrs. Tolson, Washington, D. C., yellow-fronted parrot.
 Mr. F. M. Uhler, through United States Biological Survey, weasel.
 Mrs. Walsh, Washington, D. C., opossum.
 Mrs. Martha I. Weaver, Washington, D. C., African gray parrot.
 Mrs. Charles M. Weeks, Chevy Chase, Md., white-throated capuchin.
 Mr. G. T. Wells, Gaithersburg, Md., barn owl.
 Mrs. Wm. Werntz, Annapolis, Md., orange-crowned parrot.
 Mrs. Whitehorne, Washington, D. C., cedar wax-wing.
 Mr. C. E. Whittington, United States Department of Agriculture, chicken
 turtle.
 Mr. Orme Wilson, Washington, D. C., capuchin.
 Mrs. Works, Washington, D. C., grass parakeet.
 Mrs. George M. Wright, Washington, D. C., double yellow-headed parrot.

Births.—There were 56 mammals born and 5 birds hatched in the Park during the year. These include the following:

Mammals

Scientific name	Common name	Number
<i>Ammotragus lervia</i>	Aoudad	1
<i>Axis axis</i>	Axis deer	1
<i>Bison bison</i>	American bison	1
<i>Bubalus bubalis</i>	Indian buffalo	1
<i>Canis latrans</i>	Coyote	2
<i>Canis nubilus</i>	Plains wolf	5
<i>Cervus duvaucelii</i>	Barasingha deer	1
<i>Cervus elaphus</i>	Red deer	1
<i>Dama dama</i>	Fallow deer	3
<i>Equus przewalskii</i>	Mongolian wild horse	1
<i>Felis leo</i>	Lion	2
<i>Genetta dongalana neumanni</i>	Neumann's genet	2
<i>Glaucomys volans</i>	Flying squirrel	4
<i>Hippopotamus amphibius</i>	Hippopotamus	1
<i>Lama glama</i>	Llama	2
<i>Macaca fuscata</i>	Japanese monkey	1
<i>Nasua narica</i>	Coatimundi	3
<i>Odocoileus costaricensis</i>	Costa Rican deer	1
<i>Ovis canadensis</i>	Rocky Mountain sheep	4
<i>Ovis europaeus</i>	Mouflon	1
<i>Phacochoerus aethiopicus</i>	Wart hog	4
<i>Pocphagus grunniens</i>	Yak	2
<i>Procyon lotor</i>	Raccoon	9
<i>Sika nippon</i>	Japanese deer	3

Birds

Scientific name	Common name	Number
<i>Branta canadensis occidentalis</i>	White-cheeked goose.....	3
<i>Pelecanus erythrorhynchos</i>	American white pelican.....	2

Purchases and exchanges.—Among the most important purchases during the year were a pair of macaroni penguins, four pairs of birds of paradise (Wilson's, Magnificent, King, and 12-wired), a golden headed mynah, a pair of spectacled owls, and a pair of European eagle owls, the last two being from the estate of Spedan Lewis, the noted English aviculturist; and an imperial parrot secured in Dominica through Mr. Stephan Haweis.

A pigmy hippopotamus was bought as a mate to the one already in the collection, and a male Molucca deer was also bought for the same purpose. The zoo purchased a pair of sea lions to replace those that died last year; a pair of jaguars, which have been lacking in our collection; and a black jaguar. The last is the third of its kind to come to the United States, and is an exceedingly rare and beautiful specimen.

Important animals received in exchange during the year were a pair of Molucca deer, and two pairs of axis deer, three keas, and a rare wallaroo.

REMOVALS

The most serious loss to the collection was that of old Mom, the female hippopotamus, who had been at the Park for 19 years, and during that time had given birth to seven young, five of which were raised.

Causes of death.—When it has been thought that determination of the cause of death of certain animals might be useful, the specimens have been submitted to the Pathological Division of the Bureau of Animal Industry for examination. The following list shows the results of the autopsies:

MAMMALS

Carnivora: Hemorrhagic septicemia, 1; chronic pneumonia, 1.
Pinnipedia: Gastritis, 1.
Primates: Intestinal parasites, 1.
Ungulata: Gastroenteritis, 3; pneumonia, 1; internal hemorrhage, 1; bilateral hemorrhagic impact of the adrenals, 1; no cause found, 1.
Rodentia: No cause found, 1.

BIRDS

Anseriformes: Enteritis, 2; no cause found, 1.
 Gruiformes: No cause found, 1.
 Psittaciformes: Tuberculosis, 1.
 Passeriformes: Enteritis, 1; no cause found, 1.

REPTILES

Chelonia: Intestinal ulceration, 1.

ANIMALS IN THE COLLECTION JUNE 30, 1930

Mammals

Scientific name	Common name	Number
MARSUPIALIA		
<i>Caloprymnus campestris</i>	Rat kangaroo.....	2
<i>Didelphis virginiana</i>	Opossum.....	21
<i>Macropus robustus</i>	Wallaroo or Euro.....	1
<i>Macropus rufus</i>	Great red kangaroo.....	1
<i>Phascolomys mitchelli</i>	Wombat.....	1
CARNIVORA		
<i>Acinonyx jubatus</i>	Cheeta.....	1
<i>Arctictis binturong</i>	Binturong or "Bear-Cat".....	1
<i>Bassariscus astutus</i>	Cacomixle or ring-tail.....	1
<i>Canis dingo</i>	Dingo.....	1
<i>Canis latrans</i>	Coyote.....	8
<i>Canis latrans</i>	Albino coyote.....	1
<i>Canis mesomelas</i>	Black-backed jackal.....	1
<i>Canis nubilus</i>	Plains wolf.....	11
<i>Crocuta crocuta germinans</i>	East African spotted hyena.....	1
<i>Felis capensis hindel</i>	East African serval.....	2
<i>Felis caracal nubica</i>	Abyssinian lynx.....	1
<i>Felis concolor azteca</i>	Mexican puma.....	3
<i>Felis leo</i>	Lion.....	8
<i>Felis onca</i>	Jaguar.....	2
<i>Felis onca</i>	Black jaguar.....	1
<i>Felis pardalis brasiliensis</i>	Brazilian ocelot.....	1
<i>Felis pardalis griffithii</i>	Ocelot.....	1
<i>Felis pardalis var</i>	Ocelot.....	1
<i>Felis pardus</i>	Leopard, African.....	5
<i>Felis serval</i>	Serval.....	1
<i>Felis tigris</i>	Bengal tiger.....	1
<i>Felis tigris longipilis</i>	Manchurian tiger.....	1
<i>Gennetta dongalana neumanni</i>	Neumann's genet.....	4
<i>Gulo luscus</i>	Wolverine.....	2
<i>Helarctos malayanus</i>	Sun bear.....	2
<i>Herpestes ichneumon</i>	Egyptian mongoose.....	1
<i>Hyaena brunnea</i>	Brown hyena.....	2
<i>Lutra canadensis vaga</i>	Florida otter.....	1
<i>Lynx baileyi</i>	Bailey's lynx.....	1
<i>Lynx caracal</i>	Caracal.....	1
<i>Lynx rufus</i>	Bay lynx.....	2
<i>Mellivora capensis</i>	Ratel.....	1
<i>Mephitis nigra</i>	Skunk.....	3
<i>Mustela furo</i>	Ferret.....	1
<i>Mustela noveboracensis</i>	Weasel.....	1
<i>Nasua sp.</i>	Coatimundi, silky-brown.....	1
<i>Nasua sp.</i>	Coatimundi, dark brown.....	1
<i>Nasua narica</i>	Coatimundi, gray.....	5
<i>Paradoxurus philippensis</i>	Philippine palm-civet.....	7
<i>Potos flavus</i>	Kinkajou.....	6
<i>Procyon cancrivorus</i>	Crab-eating raccoon.....	2
<i>Procyon lotor</i>	Raccoon.....	19
<i>Proteles cristatus</i>	Aard-wolf.....	1
<i>Taxidea taxus</i>	American badger.....	2
<i>Tayra barbara</i>	Tayra.....	1
<i>Thalarectos maritimus</i>	Polar bear.....	3
<i>Urocyon cinereoargenteus</i>	Gray fox.....	4
<i>Ursus americanus</i>	Black bear.....	5
<i>Ursus americanus cinnamomeus</i>	Cinnamon bear.....	2
<i>Ursus apache</i>	Apache grizzly.....	1
<i>Ursus arctos</i>	European brown bear.....	7
<i>Ursus emmonsii</i>	Glacier bear.....	1
<i>Ursus gyas</i>	Alaska Peninsula brown bear.....	4
<i>Ursus horribilis</i>	Grizzly bear.....	1

Mammals—Continued

Scientific name	Common name	Number
CARNIVORA—continued		
Ursus kидderi	Kidder's bear	2
Ursus middendorffi	Kodiak bear	2
Ursus sitkensis	Sitka bear	2
Ursus thibetanus	Himalayan bear	1
Viverra civetta	Civet	1
Viverra tangalunga	Tangalunga	7
Vulpes fulva	Red fox	1
Vulpes fulva	Silver-black fox	1
Vulpes velox	Kit fox	1
PINNIPEDIA		
Callorhinus alascanus	Northern fur seal	2
Phoca richardii	Pacific harbor seal	1
Phoca richardii geronimensis	San Geronimo harbor seal	1
Zalophus californianus	California sea lion	2
PRIMATES		
Aotus trivirgatus	Howler monkey	1
Ateles geoffroyi	Gray spider monkey	3
Cebus capucinus	Grizzled capuchin	4
Cebus hypoleucus	White-throated capuchin	7
Cercocebus fuliginosus	Sooty mangabey	4
Cercopithecus albigularis	Sykes' or "blue" monkey	5
Cercopithecus brazzae	DeBrazza's guenon	1
Cercopithecus callitrichus	Green guenon	2
Cercopithecus diana	Diana monkey	1
Cercopithecus griseoviridis	Grivet monkey	2
Cercopithecus lhoesti	Killimbira guenon	1
Cercopithecus labiata	Samango guenon	1
Cercopithecus mona	Mona monkey	3
Cercopithecus pygerythra	Vervet	1
Cercopithecus petaurista	Lesser white-nosed guenon	2
Colobus vellerosus	White-thighed colobus	1
Cynopithecus sp	Ape	1
Gorilla gorilla	Gorilla	1
Hylobates leucogenys	White-cheeked gibbon	3
Lemur macaco	Black lemur	1
Lemur rufifrons	Red-fronted lemur	1
Macaca andamanensis	Burmese macaque	1
Macaca fuscata	Japanese monkey	4
Macaca irus	Crab-eating macaque	1
Macaca mordax	Javan macaque	4
Macaca nemestrina	Pig-tailed monkey	1
Macaca rhesus	Bengal or rhesus monkey	7
Macaca speciosus	Red-faced monkey	1
Macaca syrichta	Philippine monkey	3
Magus maurus	Moor monkey	2
Pan satyrus	Chimpanzee	2
Papio cynocephalus	Anubis or yellow baboon	2
Papio hamadryas	Hamadryas baboon	1
Papio leucophaeus	Drill	1
Papio neumani	Olive baboon	2
Papio porcarius	Chacma	2
Papio sphinx	Mandrill	3
Saimiri sciureus	Titi monkey or squirrel monkey	2
Simia sylvanus	Barbary ape	2
RODENTIA		
Mus sp	White mice	100
Acanthion brachyurum	Malay porcupine	2
Castor canadensis	American beaver	2
Cavia porcellus	Domestic guinea pig	30
Citellus tridecemlineatus	13-striped gopher	6
Cuniculus paca virgatus	Central American paca	3
Cynomys ludovicianus	Prairie dogs	12
Dasyprocta punctata	Speckled agouti	2
Dasyprocta rubrata	Trinidad agouti	6
Dolichotis patagonica	Patagonian cavy	2
Glaucomys volans	Flying squirrel	9
Hydrochoerus hydrochaeris	Capybara	1
Hystrix africaeaustralis	African porcupine	3
Lagostomus trichodaetylus	Viscacha	2
Marmota monax	Woodchuck	8
Ondatra zibethica	Muskrat	2
Rhizomys badius	Bay Bamboo rat	1
Sciurus carolinensis	Albino squirrel	2
Sciurus niger	Fox squirrel	1

Mammals—Continued

Scientific name	Common name	Number
LAGOMORPHA		
<i>Oryctolagus cuniculus</i>	Domestic rabbit.....	2
ARTIODACTYLA		
<i>Æpyceros melampus suara</i>	East African impalla.....	2
<i>Ammotragus lervia</i>	Aoudad.....	4
<i>Anoa depressicornis</i>	Anoa.....	1
<i>Antilope cervicapra</i>	Black buck or indian antelope.....	1
<i>Axis axis</i>	Axis deer.....	4
<i>Bison bison</i>	American bison.....	14
<i>Bos indicus</i>	Zebu.....	1
<i>Boselaphus tragocamelus</i>	Nilgai.....	2
<i>Camelus bactrianus</i>	Bactrian camel.....	1
<i>Camelus dromedarius</i>	Arabian camel.....	1
<i>Bubalus bubalis</i>	Indian buffalo.....	2
<i>Capra hircus</i>	Goat.....	4
<i>Capra ibex</i>	Alpine ibex.....	2
<i>Cervus canadensis</i>	American elk or wapiti.....	4
<i>Cervus duvaucelii</i>	Barasingha deer.....	7
<i>Cervus elaphus</i>	Red deer.....	12
<i>Cervus hanglu</i>	Kashmir deer.....	2
<i>Cervus xanthopygus</i>	Bedford deer.....	5
<i>Connochaetes taurinus</i>	Brindled gnu.....	1
<i>Connochaetes taurinus albojubatus</i>	White-bearded gnu.....	2
<i>Dama dama</i>	Fallow deer (white).....	2
<i>Dama dama</i>	Fallow deer.....	11
<i>Hemitragus jemlahicus</i>	Tahr.....	5
<i>Hyelaphus porcinus</i>	Hog deer.....	3
<i>Lama glama</i>	Llama.....	9
<i>Lama huanacus</i>	Guanaco.....	2
<i>Odocoileus costaricensis</i>	Costa Rican deer.....	2
<i>Odocoileus hemionus</i>	Mule deer.....	2
<i>Odocoileus sitkensis</i>	Sitka black-tail deer.....	2
<i>Odocoileus virginianus</i>	Virginia deer.....	3
<i>Oreamnos americanus</i>	Mountain goat.....	2
<i>Ovibos moschatus wardi</i>	Greenland musk-ox.....	3
<i>Ovis canadensis</i>	Rocky Mountain sheep.....	10
<i>Ovis europaeus</i>	Mouflon.....	6
<i>Pecari angulatus</i>	Peccary.....	4
<i>Phacochoerus aethiopicus</i>	Wart hog.....	5
<i>Poephagus grunniens</i>	Yak.....	8
<i>Potamochoerus africanus</i>	Bush pig.....	1
<i>Rangifer tarandus</i>	Reindeer.....	4
<i>Rucervus eldii</i>	Burmese deer.....	1
<i>Rusa moluccensis</i>	Molucca deer.....	2
<i>Sika nippon</i>	Japanese deer.....	10
<i>Strepsiceros strepsiceros</i>	Greater kudu.....	1
<i>Sus scrofa</i>	European wild boar.....	2
<i>Synceros caffer</i>	South African buffalo.....	1
<i>Tragelaphus angasi</i>	Inyala.....	1
<i>Tragelaphus scriptus</i>	Harnessed antelope.....	2
PERISSODACTYLA		
<i>Choeropsis liberiensis</i>	Pigmy hippopotamus.....	2
<i>Equus grevyi-asinus</i>	Zebra-ass hybrid.....	2
<i>Equus grevyi-caballus</i>	Zebra-horse hybrid.....	1
<i>Equus onager</i>	Kiang or wild ass.....	1
<i>Equus przewalskii</i>	Mongolian wild horse.....	3
<i>Equus quagga chapmani</i>	Chapman's zebra.....	2
<i>Equus zebra</i>	Mountain zebra.....	2
<i>Hippopotamus amphibius</i>	Hippopotamus.....	1
<i>Tapirella bairdii</i>	Baird's tapir.....	1
<i>Tapirus terrestris</i>	Brazilian tapir.....	1
PROBOSCIDEA		
<i>Elaphas sumatranus</i>	Sumatra elephant.....	1
<i>Loxodonta africana oxyotis</i>	African elephant.....	1
EDENTATA		
<i>Dasyypus novemcinctus</i>	9-banded armadillo.....	1

Birds

Scientific name	Common name	Number
RATITAE		
Casuarus philipi	Slater's cassowary	1
Casuarus unipendulatus	Cassowary, single-wattled	2
Dromiceus novae hollandiae	Common emu	3
Rhea americana	Common rhea or nandu	1
Struthio australis	South African ostrich	3
Struthio camelus	Nubian ostrich	1
Struthio molybdophanes	Somali ostrich	1
SPEHNISCIFORMES		
Eudyptes chrysolophus	Maccaroni penguin	1
PELECANIFORMES		
Anhinga anhinga	Anhinga or snake bird	1
Pelecanus californicus	California brown pelican	4
Pelecanus conspicillatus	Australian pelican	2
Pelecanus erythrorhynchos	American white pelican	8
Pelecanus occidentalis	Brown pelican	5
Pelecanus onocrotalus	European white pelican	2
Pelecanus roseus	Rose-colored pelican	1
Phalacrocorax auritus floridanus	Florida cormorant	1
CICONIIFORMES		
Ajaja ajaja	Roseate spoonbill	2
Ardea goliath	Goliath heron	2
Ardea herodias	Great blue heron	2
Ardea occidentalis	Great white heron	2
Balaeniceps rex	Shoe-bill stork	1
Cochlearius cochlearius	Boat-billed heron	3
Ephippiorhynchus senegalensis	Saddle-billed stork	1
Guara alba	White ibis	4
Guara rubra	Scarlet ibis	3
Leptoptilus dubius	Indian adjutant	2
Leptoptilus javanicus	Lesser adjutant	2
Mycteria americana	Wood ibis	1
Nycticorax nycticorax naevius	Black-crowned night heron	55
Threskiornis aethiopicus	Sacred ibis	2
Threskiornis melanocephalus	Black-headed ibis	2
ANSERIFORMES		
Aix sponsa	Wood duck	2
Alopochen aegyptiacus	Egyptian goose	1
Alopochen jubatus	Orinoco goose	1
Anas platyrhynchos	Call duck	1
Anas platyrhynchos	Mallard	36
Anas rubripes	Black or dusky mallard	1
Anas undulata	African yellow-billed duck	2
Anser albifrons	White-fronted goose	5
Anser brachyrhynchus	Pink-footed goose	1
Anser cinereus domestica	Toulouse goose	2
Anser fabalis	Bean goose	2
Branta bernicla glaucogastra	Brant	7
Branta canadensis canadensis	Canada goose	13
Branta canadensis hutchinsii	Hutchins goose	2
Branta canadensis minima	Cackling goose	2
Branta canadensis occidentalis	White-cheeked goose	19
Branta leucopsis	Barnacle goose	2
Cairina moschata	Muscovy duck	2
Casarca variegata	Paradise duck	2
Chaulelasmus streperus	Gadwall	2
Chen caerulescens	Blue goose	9
Chenopsis atrata	Black swan	5
Cygnopsis cygnoides	Chinese goose	1
Cygnus gibbus	Mute swan	2
Dafla acuta	Pintail	1
Dafla bahamensis	Bahama pintail	3
Dendrocygna arborea	West Indian tree duck	1
Dendrocygna autumnalis	Black-bellied tree duck	1
Dendrocygna eytoni	Eyton's tree duck	3
Eulabeia indica	Bar-headed goose	2
Mareca americana	Baldpate	3
Metopiana peposaca	Rosy-billed pochard	3
Nesochen sandvicensis	Hawaiian goose	1
Nettion carolinense	Green-winged teal	2
Nettion formosum	Baikal teal	1
Nyroca americana	Redhead	4
Nyroca valisineria	Canvas-back	3

Birds—Continued

Scientific name	Common name	Number
ANSERIFORMES—continued		
<i>Olor columbianus</i>	Whistling swan.....	2
<i>Phalacrocorax canadensis</i>	Emperor goose.....	3
<i>Plectropterus gambensis</i>	Spur-winged goose.....	4
<i>Querquedula querquedula</i>	Garganey.....	2
FALCONIFORMES		
<i>Aegypius monachus</i>	Cinereous vulture.....	2
<i>Aquila chrysaetos</i>	Gold eagle.....	4
<i>Aquila rapax</i>	Tawny eagle.....	2
<i>Buteo borealis</i>	Red-tailed hawk.....	3
<i>Buteo lineatus</i>	Red-shouldered hawk.....	1
<i>Buteo platypterus</i>	Broad-winged hawk.....	4
<i>Cathartes aura</i>	Turkey vulture.....	4
<i>Coragyps atratus</i>	Black vulture.....	2
<i>Elanus caeruleus</i>	White kite.....	1
<i>Falco peregrinus</i>	Peregrine falcon.....	1
<i>Falco sparverius</i>	Sparrow hawk.....	3
<i>Gymnogyps californianus</i>	California condor.....	3
<i>Gyps rueppelli</i>	Ruppell's vulture.....	2
<i>Haliaeetus leucocephalus</i>	Bald eagle.....	16
<i>Haliaeetus leucorhynchus</i>	Malay brahmyn kite.....	1
<i>Milvus migrans</i>	Yellow-billed kite.....	1
<i>Otogyps auricularis</i>	African eared vulture.....	3
<i>Polyborus cheriway</i>	Audubon's caracara.....	4
<i>Pseudogyps africanus</i>	White-headed vulture.....	1
<i>Sagittarius serpentarius</i>	Secretary vulture.....	1
<i>Sarcoramphus papa</i>	King vulture.....	2
<i>Torgos tracheliotes</i>	African black vulture.....	1
<i>Uroaetus audax</i>	Wedge-tailed eagle.....	2
<i>Vultur gryphus</i>	South American condor.....	1
GALLIFORMES		
<i>Acryllium vulturinum</i>	Vulturine guinea-fowl.....	3
<i>Argusianus argus</i>	Argus pheasant.....	2
<i>Colinus virginianus</i>	Bob-white.....	1
<i>Chrysolophus amherstiae</i>	Lady Amherst's pheasant.....	1
<i>Chrysolophus pictus x amherstiae</i>	Hybrid pheasant.....	1
<i>Coturnix coturnix</i>	Migratory quail.....	4
<i>Crax globicera</i>	Mexican curassow.....	2
<i>Crax globulosa</i>	Spix's wattled curassow.....	3
<i>Crax panamensis</i>	Panama curassow.....	1
<i>Excalfactoria chinensis</i>	Pigmy quail.....	3
<i>Gallus varius</i>	Javan jungle fowl.....	1
<i>Gennaenus edwardsi</i>	Edwards's pheasant.....	1
<i>Gennaenus nyctemerus</i>	Silver pheasant.....	2
<i>Lophortyx californica vallicola</i>	Valley quail.....	1
<i>Mitu mitu</i>	Razor-billed curassow.....	1
<i>Numida mitrata reichenowi</i>	Reichenow's helmeted guinea-fowl.....	5
<i>Oreortyx picta</i>	Mountain quail.....	1
<i>Ortalis cinereiceps</i>	Gray-headed chachalaca.....	2
<i>Ortalis leucogastra</i>	Chachalaca.....	1
<i>Pavo cristatus</i>	Peafowl.....	10
<i>Pavo cristatus</i>	White peafowl.....	2
<i>Penelope boliviana</i>	Crested guan.....	2
<i>Phasianus torquatus</i>	Ring-necked pheasant.....	17
GRUIFORMES		
<i>Anthropoides virgo</i>	Demoiselle crane.....	3
<i>Balearica pavonina</i>	West African crowned crane.....	5
<i>Dissura episcopus</i>	Woolly-necked stork.....	1
<i>Fulica americana</i>	Coot.....	8
<i>Gallinula chloropus brachyptera</i>	African moorhen.....	2
<i>Gallirallus australis</i>	South Island weka rail.....	1
<i>Grus canadensis</i>	Little brown crane.....	3
<i>Grus leucauchen</i>	White-naped crane.....	1
<i>Grus leucogeranus</i>	Siberian crane.....	1
<i>Grus lilfordi</i>	Lilford's crane.....	1
<i>Grus mexicana</i>	Sandhill crane.....	2
<i>Grus nigricollis</i>	Manchurian crane.....	2
<i>Hypotaenidia philippensis</i>	Lesser rail.....	2
<i>Mathewsena rubicunda</i>	Australian crane.....	2
<i>Microtribonyx ventralis</i>	Black-tailed moorhen.....	1
<i>Porphyrio melanotus</i>	New Zealand mudhen.....	1
<i>Psophia crepitans</i>	Trumpeter.....	2
<i>Psophia viridis</i>	Green-winged trumpeter.....	1
<i>Rhynochetos jubatus</i>	Kagu.....	1
<i>Tetraptyx paradisea</i>	Stanley or paradise crane.....	2

Birds—Continued

Scientific name	Common name	Number
CHARADRIIFORMES		
Larus argentatus.....	Herring gull.....	2
Larus atricilla.....	Laughing gull.....	1
Larus californicus.....	California gull.....	10
Larus marinus.....	Great black-backed gull.....	2
Larus novaehollandiae.....	Silver gull.....	34
Larus occidentalis.....	Western gull.....	6
Oedienemus bistriatus vocifer.....	South American stone plover.....	1
Philomachus pugnax.....	Ruff.....	5
Sterna caspia.....	Caspian tern.....	5
COLUMBIFORMES		
Caloenas nicobarica.....	Nicobar pigeon.....	5
Chalcophaps indica.....	Green-winged dove.....	3
Columba guinea.....	Speckled pigeon.....	4
Gallicolumba luzonica.....	Bleeding-heart dove.....	4
Globicera pacifica.....	Pacific pigeon.....	1
Goura victoria.....	Victoria crowned pigeon.....	1
Janthoenas vitiensis.....	White-throated fruit pigeon.....	1
Macropygia doreya.....	New Guinea brown pigeon.....	1
Melopelia asiatica.....	White-winged dove.....	1
Oena capensis.....	Namaqua dove.....	1
Streptopelia risoria.....	Ringed turtle dove.....	1
Streptopelia senegalensis.....	East African ring-necked dove.....	17
Streptopelia sp.....	Ground dove.....	1
Turtur chalcospilos.....	Emerald-spotted ground dove.....	1
Zenaidura macroura carolinensis.....	Mourning dove.....	1
Zenaidura macroura macroura.....	West Indian dove.....	1
CUCULIFORMES		
Eudynamis honorata.....	Indian koel.....	1
Turacus leucotis donaldsoni.....	Donaldson's turaco.....	1
PSITTACIFORMES		
Agapornis fischeri.....	Fischer's love-bird.....	2
Agapornis lilianae.....	Nyassa love-bird.....	9
Agapornis madagascariensis.....	Gray-headed love-bird.....	3
Agapornis personata.....	Yellow-collared love-bird.....	1
Agapornis pullaria.....	Red-faced love-bird.....	2
Agapornis taranta.....	Abyssinian love-bird.....	3
Amazona sp.....	parrot.....	1
Amazona aestiva.....	Amazona parrot.....	1
Amazona albifrons.....	White-fronted parrot.....	9
Amazona albifrons nana.....	Lesser white-fronted parrot.....	1
Amazona amazonica.....	Orange-winged parrot.....	3
Amazona arausiaca.....	Bouquet's parrot.....	1
Amazona auropalliata.....	Yellow-naped parrot.....	2
Amazona farinosa.....	Mealy parrot.....	1
Amazona festiva.....	Festive parrot.....	2
Amazona leucocephala.....	Cuban parrot.....	6
Amazona ochrocephala.....	Yellow-fronted parrot.....	8
Amazona ochroptera.....	Yellow-shouldered parrot.....	2
Amazona oratrix.....	Double-yellow-head parrot.....	9
Amazona ventralis.....	Santo Domingo parrot.....	1
Amazona viridigenalis.....	Red-crowned parrot.....	5
Anodorhynchus hyacinthinus.....	Hyacinthine macaw.....	1
Aprosmictus erythropterus.....	Crimson-winged parouquet.....	1
Ara ararauna.....	Yellow and blue macaw.....	5
Ara macao.....	Red, blue and yellow macaw.....	3
Ara maracana.....	Illiger's macaw.....	1
Ara mexicana.....	Mexican green macaw.....	2
Ara sp.....	macaw.....	1
Aratinga rubritorquis.....	Red-throated conure.....	1
Brotogeris jugularis.....	Tovi parouquet.....	2
Brotogeris virens.....	White-winged parouquet.....	1
Conurus longicauda.....	Long-tailed parouquet.....	2
Conurus nepalensis.....	Nepalese parouquet.....	1
Coracopsis nigra.....	Lesser vasa parrot.....	1
Coracopsis vasa.....	Greater vasa parrot.....	1
Cyanopsittacus spixi.....	Spix's macaw.....	2
Derophtus accipitrinus.....	Hawk-head parrot.....	2
Eos bornea.....	Red lory.....	2
Eos variegata.....	Purple lory.....	1
Eupsittula aurea.....	Golden-crowned parouquet.....	2
Eupsittula canicularis.....	Petz' parouquet.....	2
Eupsittula jendaya.....	Jenday parouquet.....	1
Eupsittula weddellii.....	Weddell's parouquet.....	3
Kakatoe alba.....	White cockatoo.....	1
Kakatoe galerita.....	Sulphur-crested cockatoo.....	3

Birds—Continued

Scientific name	Common name	Number
PSITTACIFORMES—continued		
Kakatoe gymnops	Bare-eyed cockatoo	1
Kakatoe leadbeateri	Leadbeater's cockatoo	2
Kakatoe moluccensis	Great red-crested cockatoo	1
Kakatoe roseicapilla	Roseate cockatoo	11
Leptoclophus novaehollandicus	Cockatiel	2
Lorius novae	Ceram lory	1
Melopsittacus undulatus	Grass paraquet	8
Microglossus aterrimus	Great black cockatoo	1
Myiopsitta monachus	Quaker paroquet	3
Nandayus nanday	Nanday paroquet	1
Nestor notabilis	Kea	6
Pionus maximiliani	Maximilian's parrot	1
Pionus menstruus	Blue-headed parrot	2
Pionites xanthermeria	Amazonian caique	3
Platyercus eximius	Rosella paroquet	1
Poicephalus meyeri matschiei	East African brown parrot	2
Psephotus haemorrhous	Red-vented blue-bonnet paroquet	1
Psittacus erithacus	African gray parrot	1
Psittaculus guianensis	Green-rumped parrotlet	2
Pyrrhura picta	Blue-winged conure	1
Tanygnathus megalorhynchus	Great-billed paroquet	1
Trichoglossus cyanogrammus	Green-naped lorikeet	1
Trichoglossus forsteni	Forsten's paroquet	3
Trichoglossus ornatus	Ornate lory	1
STRIGIFORMES		
Bubo africanus	Spotted eagle-owl	1
Bubo bubo	Eagle-owl	3
Bubo virginianus	Great horned owl	5
Bubo virginianus	Great horned owl (albino)	1
Nyctea nyctea	Snowy owl	1
Otus asio	Screech owl	4
Pulsatrix perspicillata	Spectacled owl	1
Strix varia varia	Barred owl	4
Tyto alba affinis	African barn owl	1
Tyto alba pratincola	American barn owl	4
CORACIIFORMES		
Anthracoceros malayanus	White-browed hornbill or Malayan pied hornbill	1
Lophoceros jacksoni	Jackson's hornbill	1
PICIFORMES		
Aulacorhamphus sulcatus	Toucanette	1
Ramphastos ariel	Ariel toucan	1
Ramphastos carinatus	Lemon-breasted toucan	3
Ramphastos culminatus	White-breasted toucan	1
Trachyphonus emini	Emin Pasha's barbet	1
PASSERIFORMES		
Acridotheres tristis	Common mynah	1
Aethiopsar cristatellus	Crested mynah	1
Agelaius heterocephalus	Yellow-headed marsh bird	1
Aidemosyne cantans	Tawny waxbill	3
Amandava amandava	Strawberry finch	18
Amanina fasciata	Cut-throat finch	13
Amblyramphus holosericeus	Red-headed marsh troupial	1
Bombycilla cedrorum	Cedar wax-wing	1
Calocitta formosa	Mexican magpie jay	3
Carduelis carduelis	European goldfinch	2
Chasmorhynchus nudicollis	Naked-throated bell bird	1
Chloris chloris	Green finch	1
Cinnurus regius	King bird of paradise	1
Cissilopha yucatanica	Yucatan jay	1
Colius macrourus	Mouse bird or coly	1
Corvultur albicollis	White-necked raven	1
Corvus albus	White-breasted crow	2
Corvus brachyrhynchus	American crow	4
Corvus corax sinuatus	Raven	5
Corvus coronoides	Australian crow	1
Cosmopsarus regius	Splendid starling	3
Cyanocitta stelleri diademata	Long-crested jay	1
Cyanocorax pileatus	Pileated jay	2
Diatropura prognis	Giant whydah	1
Eremopterix leucopareia	Fischer's finch lark	1

Birds—Continued

Scientific name	Common name	Number
PASSERIFORMES—continued		
<i>Estrilda melpoda</i>	Orange-cheeked waxbill	3
	finch	8
<i>Foudia madagascariensis</i>	Madagascar weaver	4
<i>Galeospar salvadorii</i>	Crested starling	1
<i>Garrulax pectoralis</i>	Black-gorgeted laughing thrush	2
<i>Gracula javana</i>	Hill mynah	1
<i>Gracula religiosa</i>	Southern hill mynah	2
<i>Gymnomystax melanicterus</i>	Bare-jawed troupial	1
<i>Gymnorhina tibicen</i>	Piping crow-shrike	1
<i>Heteropsar albicapillus</i>	White-capped starling	1
<i>Icterus parisorum</i>	Scott's oriole	1
<i>Lamprocolius s. pestis</i>	Southern glossy starling	1
<i>Lamprocorax metallicus</i>	Shining starling	2
<i>Liothrix luteus</i>	Red-billed bill-tit	1
<i>Melanopteryx rubiginosus</i>	Chestnut weaver	28
<i>Mino dumonti</i>	Golden-headed mynah	1
<i>Molpastes haemorrhous</i>	Black-headed bulbul	2
<i>Munia atricapilla</i>	Black-headed nun	1
<i>Munia castaneithorax</i>	Chestnut-breasted finch	1
<i>Munia oryzivora</i>	Java sparrow	12
<i>Munia punctulata</i>	Nutmeg finch	20
<i>Otocompa jocosus</i>	Red-eared bulbul	3
<i>Paradisea sanguinea</i>	Red bird of paradise	2
<i>Paradisornis rudolphi</i>	Prince Rudolph's blue bird of paradise	1
<i>Peroaria cucullata</i>	Red-crested cardinal	3
<i>Parotia lawesi lawesi</i>	Lawes' six-plumed bird of paradise	1
<i>Perisoreus canadensis capitalis</i>	Rocky Mountain jay	4
<i>Pica pica hudsonia</i>	American magpie	5
<i>Ploceus intermedius</i>	Masked weaver	7
<i>Poephila personata</i>	Masked grass-finch	1
<i>Pyromelana orix</i>	Red-crowned bishop bird	4
<i>Pytilia kirki</i>	East African fire-throated finch	1
<i>Quelea quelea</i>	Red-billed weaver	45
<i>Schlegelia wilsoni</i>	Wilson's bird of paradise	2
<i>Selencoides niger</i>	12-wired bird of paradise	2
<i>Semioptera wallacei</i>	Wallace's bird of paradise	1
<i>Serinus canarius</i>	Canary	9
<i>Sicalis flaveola</i>	Saffron finch	2
<i>Steganopleura guttata</i>	Diamond finch	1
<i>Steganura paradisea</i>	Paradise whydah	1
<i>Struthidea cinerea</i>	Australian gray jumper	1
<i>Sturnus vulgaris</i>	Starling	3
<i>Taeniopygia castanotis</i>	Zebra finch	1
<i>Uraeginthus bengalus cyanocephalus</i>	Blue-headed blue waxbill	1
<i>Urobrachya sp.</i>	Chestnut-winged whydah	1
<i>Urocissa occipitalis</i>	Red-billed blue magpie	3
<i>Vidua macroura</i>	Pintail whydah	1
<i>Xanthoura luxuosa</i>	Green jay	2
<i>Xanthoura luxuosa guatemalensis</i>	Guatemala green jay	2

Reptiles

Scientific name	Common name	Number
TESTUDINATA		
<i>Amyda ferox</i>	Soft-shelled turtle	8
<i>Chelodina longicollis</i>	Australian snake-necked turtle	3
<i>Chelydra osceola</i>	Osceola snapping turtle	1
<i>Chelydra serpentina</i>	Common snapping turtle	1
<i>Chrysemys picta</i>	Painted turtle	4
<i>Clemmys insculpta</i>	Wood tortoise	2
<i>Clemmys marmoratus</i>	Western spotted turtle	1
<i>Deirochelys reticularia</i>	Chicken turtle	3
<i>Emys orbicularis</i>	European pond turtle	11
<i>Geoclemmys spengleri</i>	Loochoo terrapin	1
<i>Geomyda thermalis</i>	Senegalese terrapin	1
<i>Gopherus polyphemus</i>	Gopher tortoise	6
<i>Kinosternon flavescens</i>	Musk turtle	3
<i>Kinosternon scorpioides</i>	South American mud turtle	5
<i>Kinosternon subrubrum</i>	Mud turtle	15
<i>Pelomedusa galeata</i>	African water tortoise	17

Reptiles—Continued

Scientific name	Common name	Number
TESTUDINATA—continued		
<i>Pelusios nigricans</i>	Black water tortoise.....	3
<i>Pseudemys palustris</i>	West Indian fresh water turtle.....	2
<i>Terrapene carolina</i>	Eastern box turtle.....	2
<i>Terrapene major</i>	Florida box turtle.....	7
<i>Terrapene ornata</i>	Western ornate turtle.....	6
<i>Testudo calcarata</i>	Abyssinian tortoise.....	1
<i>Testudo ephippium</i>	Duncan Island tortoise.....	4
<i>Testudo porteri</i>	Indefatigable Island tortoise.....	1
<i>Testudo tabulata</i>	South American tortoise.....	9
<i>Testudo vicina</i>	Albemarle Island tortoise.....	2
LORICATA		
<i>Alligator mississippiensis</i>	American alligator.....	25
<i>Osteolaemus tetraspis</i>	West African broad-nosed crocodile.....	6
SQUAMATA		
Suborder—SAURIA		
<i>Conolophus pallidus</i>	Barrington iguana.....	1
<i>Conolophus suberistatus</i>	Galapagos iguana.....	1
<i>Cyclura cornuta</i>	Rhinoceros iguana.....	6
<i>Heloderma horridum</i>	Beaded lizard.....	2
<i>Heloderma suspectum</i>	Gila monster.....	6
<i>Hydrosaurus pustulosus</i>	Philippine water-dragon.....	2
<i>Iguana iguana</i>	Common iguana.....	3
<i>Phrynosoma cornutum</i>	Horned lizard.....	4
<i>Sceloporus undulatus</i>	Fence or pine lizard.....	1
<i>Trachysaurus rugosus</i>	Stump-tailed lizard.....	2
Suborder—SERPENTES		
<i>Agkistrodon mokasen</i>	Copperhead.....	7
<i>Boa imperator</i>	Emperor boa.....	2
<i>Coluber constrictor</i>	Blacksnake.....	5
<i>Crotalus horridus</i>	Banded rattlesnake.....	2
<i>Epicrates striatus</i>	Haitian boa.....	4
<i>Eunectes murinus</i>	Anaconda.....	1
<i>Lampropeltis getulus</i>	King snake.....	2
<i>Leimadophis parvifrons</i>	Haitian ribbon snake.....	1
<i>Masticophis flagellum frenatus</i>	Red racer.....	1
<i>Naia nigricollis</i>	Black-necked spitting cobra.....	1
<i>Pituophis melanoleucus</i>	Pine snake.....	3
<i>Python regius</i>	Ball python.....	1
<i>Python reticulatus</i>	Regal python.....	5
<i>Python sebae</i>	African python.....	4
<i>Sonora occipitalis</i>	Tricolor ground snake.....	1
<i>Uromacer sp.</i>	Green vine snake.....	2

Amphibians

Scientific name	Common name	Number
CAUDATA		
<i>Megalobatrachus maximus</i>	Giant salamander.....	2
SALIENTIA		
<i>Bufo marinus</i>	Giant toad.....	2
<i>Bufo quercicus</i>	Oak toad.....	1
<i>Bufo terrestris</i>	Florida toad.....	3
<i>Hyla sp.</i>	Tree frog.....	10
<i>Leptodactylus pentadactylus</i>	Dominican frog.....	5
<i>Xenopus mulleri</i>	East African smooth-clawed frog.....	4

Crustaceans

Scientific name	Common name	Number
<i>Cenobita clypeatus</i> (Herbst).....	Land hermit crab.....	25

Statement of the collection

	Mammals	Birds	Reptiles and batrachians	Crustaceans	Total
Presented.....	190	142	174	50	556
Born.....	56	5			61
Received in exchange.....	16	15			31
Purchased.....	38	56	11		105
On deposit.....	1	1	4		6
Total.....	301	219	189	50	759

Summary

Animals on hand July 1, 1929.....	2, 211
Accessions during the year.....	759
Total animals in collection during year.....	2, 970
Removed from collection by death, exchange, and return of animals on deposit.....	974
	1, 996

Status of collection

	Species	Individuals
Mammals.....	190	678
Birds.....	327	1, 046
Reptiles and batrachians.....	61	247
Crustaceans.....	1	25
Total.....	579	1, 996

VISITORS

The estimated attendance as recorded in the daily reports of the park was about the same as for the preceding year, in spite of the unusually inclement winter weather.

1929	1930
July..... 273, 500	January..... 58, 950
August..... 284, 400	February..... 64, 150
September..... 360, 600	March..... 215, 700
October..... 198, 150	April..... 359, 175
November..... 99, 850	May..... 237, 200
December..... 72, 266	June..... 301, 200
	Total visitors for year_ 2, 525, 141

The visitors are from every State in the Union and practically all parts of the world.

The attendance of organizations, mainly classes of students, of which we have definite record, was 28,814 from 465 different schools, in 15 States and the District of Columbia, as follows:

States	Number persons	Number parties	States	Number persons	Number parties
Connecticut.....	70	1	North Carolina.....	747	16
Delaware.....	62	3	Ohio.....	151	5
District of Columbia.....	10,207	189	Pennsylvania.....	6,664	92
Georgia.....	25	1	South Carolina.....	293	3
Maryland.....	4,176	58	Tennessee.....	129	2
Massachusetts.....	438	6	Virginia.....	854	19
Michigan.....	123	4	West Virginia.....	550	6
New Jersey.....	2,960	41			
New York.....	1,365	19	Total.....	28,814	465

Even casual observation of the cars parked in the zoo gives a fair cross section of the visiting public, but many of the local cars visiting the zoo from the District of Columbia, Maryland, and Virginia carry visitors from distant States and from remote parts of the world.

The National Zoological Park serves a higher and more important function than that which is most commonly attributed to it. In addition to being a place for recreation and entertainment, it is an important and unique educational institution. It is unique in that it is a place of study for all ages and degrees of scholarship, from the young child to the veteran naturalist and research man.

Its accumulated data on animals handled over a period of 40 years are constantly referred to. Facts learned regarding animals in the zoo often have a very practical application in other fields of activity.

The beginner in zoology gains at the zoo a grasp of the differences and likenesses between animals, while he rubs shoulders with the advanced medical man studying the primates to help him in solving problems concerned with the health of mankind. The study of parasites and diseases of wild animals in the zoo assists students of parasites and diseases of man and domestic animals in their researches. In short, the National Zoological Park as a laboratory is probably of even greater value to the American people than it is as a recreational area.

IMPROVEMENTS

A contract was let for the construction of the reptile house, and the work was started in March, 1930. This building promises to be one of the finest of its kind in the world. It will allow the zoo for the first time in its history to maintain a collection of cold-blooded vertebrates as well as certain invertebrates.

During the year many minor improvements have been made in connection with usual maintenance operations. A new type of label is being tried out, and the less legible of the older type are being replaced as rapidly as possible by the new style.

The American waterfowl pond was cleaned by hydraulicking, which restored it to a very satisfactory condition.

The destruction of the old bird house may be considered one of the greatest improvements the park has made in years, but it greatly reduced the housing facilities and no attempt at all has been made to obtain quantities of specimens of the smaller birds and mammals even to replace those lost during the year. There being no empty cages to fill, the zoo has been able to pick and choose in making purchases, so that at the present time the collection contains a great number of interesting rarities, including a number of species unique in American collections.

NEEDS OF THE ZOO

Quarters for animals remain the most urgent need of the park. The greatest need is for a house in which can be displayed representatives of the large and very interesting group of small mammals. The need for such a house has previously been emphasized.

The National Zoological Park is second to none in natural beauty, and its building program is planned to conserve this by means of constructing a few large, capacious exhibition buildings instead of more numerous small ones, each of the new buildings to house several groups of animals.

Hence, in the small-mammal house it is proposed to provide quarters also for the great apes. The park has an excellent collection of these, but they are now housed in such small cages that they do not appear to the best advantage and can be seen by comparatively few people at one time.

The fire department of Washington has investigated the fire-prevention facilities in the park and finds that the fire hazards are very great on account of inadequate water mains and equipment. Expansion of the water system is therefore very urgently needed as a protection against fire and at the same time to augment the park's inadequate regular supply.

It is now 40 years since the park was established. Much of the woodwork and ironwork in buildings and enclosures constructed in the earlier days, and even comparatively recently, has deteriorated from natural causes and from the unusual conditions present in the zoo, so that we are now confronted with an early and necessary program of replacement. One pair of boilers now 51 years old in the central heating plant have been passed by the boiler inspectors

for only 60 pounds of steam for the present winter, and must be replaced at a very early date. The entire floor in the lion house has been given added support from beneath from time to time, but decay has progressed to such an extent that it is now almost beyond repair and must be replaced in the near future.

Respectfully submitted.

W. M. MANN, *Director.*

DR. CHARLES G. ABBOT,
Secretary, Smithsonian Institution.

APPENDIX 7

REPORT ON THE ASTROPHYSICAL OBSERVATORY

SIR: I have the honor to submit the following report on the activities of the Astrophysical Observatory for the fiscal year ended June 30, 1930:

PLANT AND OBJECTS

This observatory operates regularly the central station at Washington and two field stations for observing solar radiation on Table Mountain, Calif., and Mount Montezuma, Chile. The station at Mount Brukkaros, South West Africa, which was established by the National Geographic Society, is being continued for the present in cooperation with the Astrophysical Observatory with funds donated by a friend of the Institution. In addition, the observatory controls a station on Mount Wilson, Calif., where occasional expeditions are sent for special investigations.

The principal aim of the observatory is the exact measurement of the intensity of the radiation of the sun as it is at mean solar distance outside the earth's atmosphere. This is ordinarily called the solar constant of radiation, but the observations of past years by this observatory have proved it variable. As all life, as well as the weather, depends on solar radiation, the observatory has undertaken the continued measurement of solar variation on all available days. These measurements have now continued all the year round for 11 years. As will appear in this report, recent studies indicate that the permanent continuation of these daily solar-radiation measurements may have great value for weather forecasting. In addition to this principal object, the observatory undertakes spectroscopic researches on radiation and absorption of atmospheric constituents, radiation of special substances such as water vapor, ozone, carbonic-acid gas, liquid water, and others, and the radiation of the other stars as well as of the sun.

WORK AT WASHINGTON

Continuous series of solar observations having been made as hitherto at several field stations on desert mountains in distant lands, these observations have been critically studied and prepared for publication at Washington. Several new investigations based on these observations have been made during the year.

(a) *Reduction of observations.*—The observers in the field at Montezuma, Chile, completely reduce their measurements according to a definitive system adopted several years ago. Telegrams in code arriving daily from Montezuma are decoded and furnished about 24 hours after observing to the United States Weather Bureau, which publishes the solar constant values on the Washington daily weather map. It is planned to include these results also in a broadcast of miscellaneous geophysical data to begin in July, 1930, under the auspices of Science Service.

The variations of solar radiation seldom range beyond 3 per cent, yet, as will appear below, they seem to produce important weather changes even when as small as 0.5 per cent. It is only at high-altitude stations under very tranquil sky conditions that results of sufficient accuracy to display these small solar variations are to be obtained. Although visibly excellent, our station at Table Mountain, Calif. (longitude $117^{\circ} 41' W.$, latitude $34^{\circ} 22' N.$, altitude 7,500 feet), as yet fails to give results of equal consistency to those of the station of Montezuma. A thorough rereduction of all the Table Mountain observations, 1925 to 1930, has been completed, with great labor, during the past fiscal year. But it is disappointing. Fluctuations too evidently produced by the haziness or humidity of the atmosphere still are found occasionally in magnitudes of the order of 2 per cent. Accordingly, a new method of reduction designed to more effectively allow for these atmospheric changes was being developed at the close of the period covered by this report. Preliminary results by it seemed more promising. Reduction of Mount Brukkaros observations is being postponed until the success of this new method is tested for Table Mountain.

(b) *Atmospheric ozone.*—As stated in last year's report, one troublesome feature of the Table Mountain work has but lately come to light through the studies of Fowle and of Dobson. It appears that a variation of large percentage occurs in the quantity of atmospheric ozone prevailing at very high levels above Table Mountain. Fortunately only about one-fifth as much change of ozone occurs above Montezuma. The change occurring above Table Mountain is sufficient, if uncorrected for, to introduce nearly 1 per cent change in the results on the solar constant of radiation, but the corresponding effect at Montezuma is negligible.

We were not aware of this source of error when the Table Mountain station was first occupied. It was not until several years after the work began that we introduced there Dobson's method of measuring ozone. Hence, if ozone corrections to solar constant values were to be made from 1925 on, daily, and not merely by averages, as suggested in last year's report, it became necessary to discover a

method whereby the correction could be computed from our daily solar constant observation themselves. This has been done.

Figure 1 shows a portion of the solar energy curve observed at airmass 2.0. The ozone absorption occurs between places 20 and 26 of this curve, but is barely, if at all, visually discernible thereon, even when ozone is most prevalent. However, its effects can be made both discernible and measurable by the following simple procedure. If we take half a dozen of the best days observed in autumn, when the ozone is near its minimum amount, and compute the mean values of the heights of the energy curve in the blue, green, yellow, and red we obtain thereby standard values proportional to the dis-

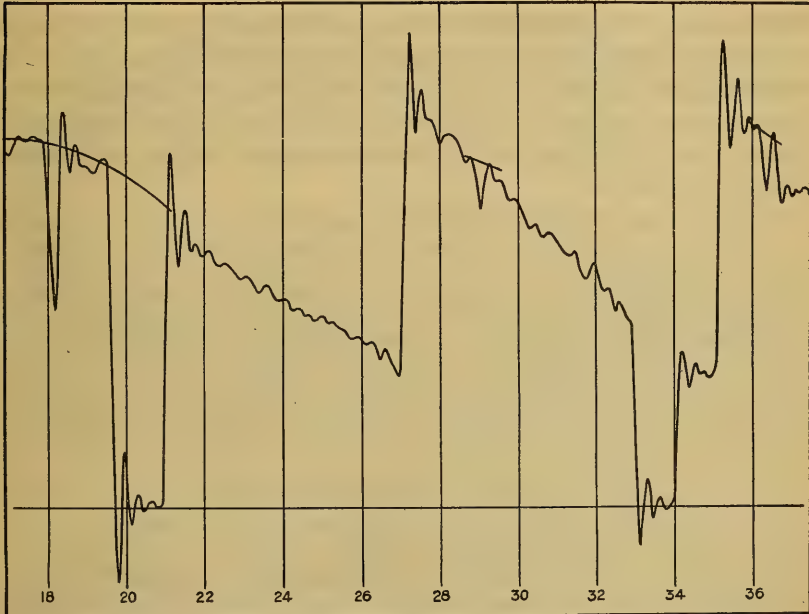


FIGURE 1.—Solar energy curve in the region of absorption by atmospheric ozone

tribution of energy in this region. These standard values, as thus extended from the violet of the spectrum to the red, overlap at each end the ozone region. Next consider the observations of the heights of the energy curve at these selected places on any given day of observation. We divide them by the standard values just referred to and the result is a series of ratios, near unity, but tending sometimes to be lower in the violet than in the red, or vice versa. If plotted against the spectrum place-numbers, these ratios may lie nearly in straight lines. But if the ozone content of the atmosphere on the day examined is different, being larger or smaller, than that of the average of the standard days, then the ratio plot just described presents a loop below or above that straight line which is fixed by

the unaffected spectrum regions in the violet and the red. These facts are illustrated in Figure 2.

The deviation from the straight-line plots of these energy spectrum ratios becomes, then, a measure of the ozone contents of the higher

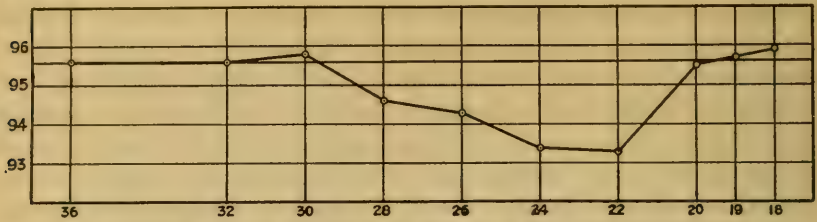


FIGURE 2.—Graph for measuring absorption by atmospheric ozone

atmosphere. The results have been so reduced by us as to give the percentage corrections for ozone absorption to be applied to our solar-constant values on all days of observation at Table Mountain. These corrections apply only to the so-called "short method" of observation. The long method takes cognizance of the ozone absorption in another way.

By the generosity of a friend of the Institution we are preparing to send an expedition to Table Mountain in September, 1930, to

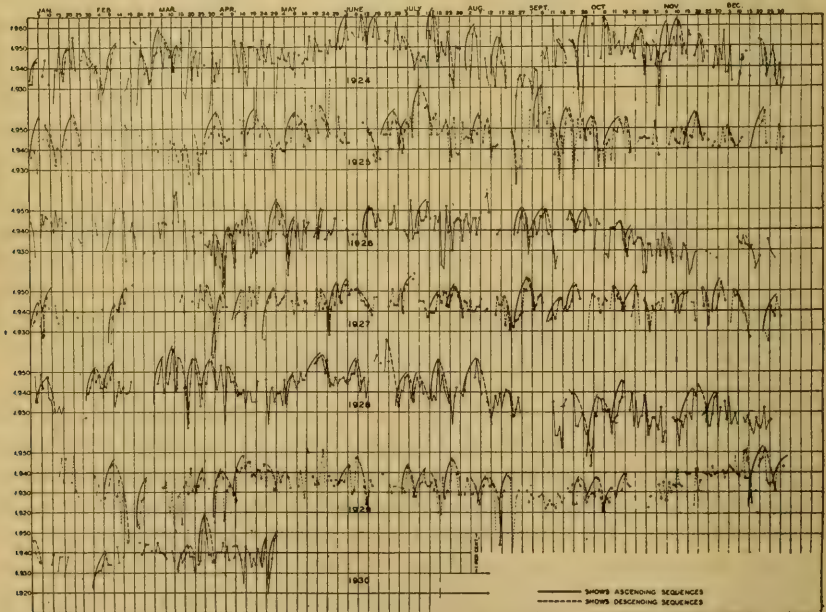


FIGURE 3.—Variations of solar radiation since 1924

make solar observations there through definite known amounts of ozone, so as independently to standardize this new ozone method. The method is applicable on all days when solar radiation work has ever been done.

(c) *Solar variation and temperature changes.*—Obviously the weather depends on the sun. If the sun's emission of radiation varies, then the weather must change in some measure on that account. Having six consecutive years of daily observations of solar variation, made and reduced in the most exact way at Montezuma, the variations have been compared with temperature changes in Washington, Williston, and Yuma.

Figure 3 shows the solar radiation measurements at Montezuma since 1924. Satisfactory, nearly satisfactory, and unsatisfactory observations are indicated thereon by circles, crosses, and points, respectively. In passing, I draw attention to the facts that the results

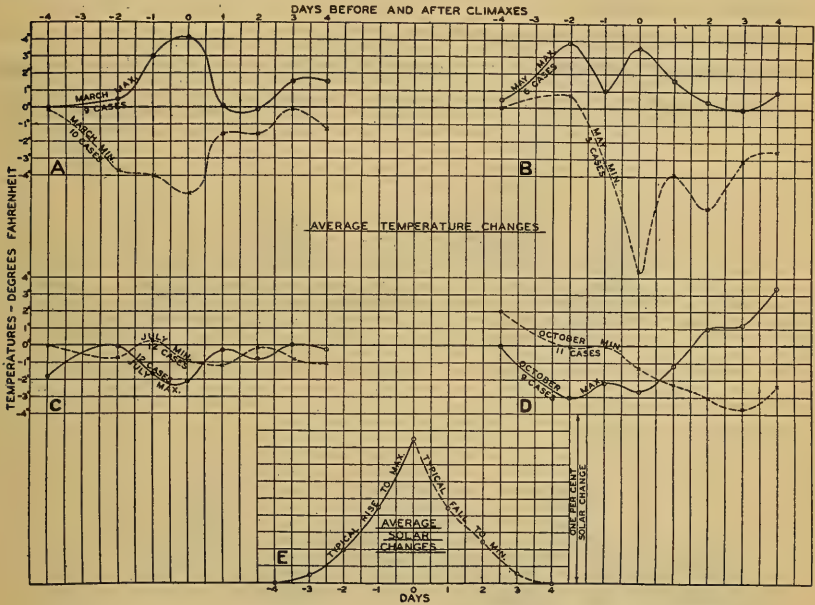


FIGURE 4.—Solar changes and associated temperature changes at Washington

average higher in 1924 and 1925 than in 1929, but return to higher values during the summer of 1930. Also the years 1924, 1926, and 1928, are more affected by long range variations than 1925, 1927, and 1929. This fact tends to verify the 2-year period of solar variation to which I drew attention in last year's report.

What I now particularly note are the numerous cases of sequences of ascending and descending solar radiation values, occupying about 4 days per sequence. These are indicated by curved full and dotted lines respectively in Figure 3. There are 98 cases of ascending and 91 cases of descending sequences thus indicated. If it had been possible to observe on all days, there would probably have been nearly twice as many such sequences. I have omitted cases where the

change was less than 0.4 per cent in the solar constant value, and also have omitted cases depending on isolated or unsatisfactory values.

Corresponding to each of these 189 cases I have tabulated the mean temperature of Washington, Williston, and Yuma, for a 9-day period, of which the day of culmination of the solar change is the fifth or central day. Taking each month of the year by itself, I have computed the average march of temperature over such 9-day intervals. In illustration, I gave Tables 1 and 2, showing the Washington temperature results of March, and Figure 4, which shows, at A, B, C, and D, the mean values for March, May, July, and October. There is given at E the average changes of solar radiation values corresponding thereto.

There are several reversals of sign of the average temperature effects during the year. In Figure 5, I give a study of these changes

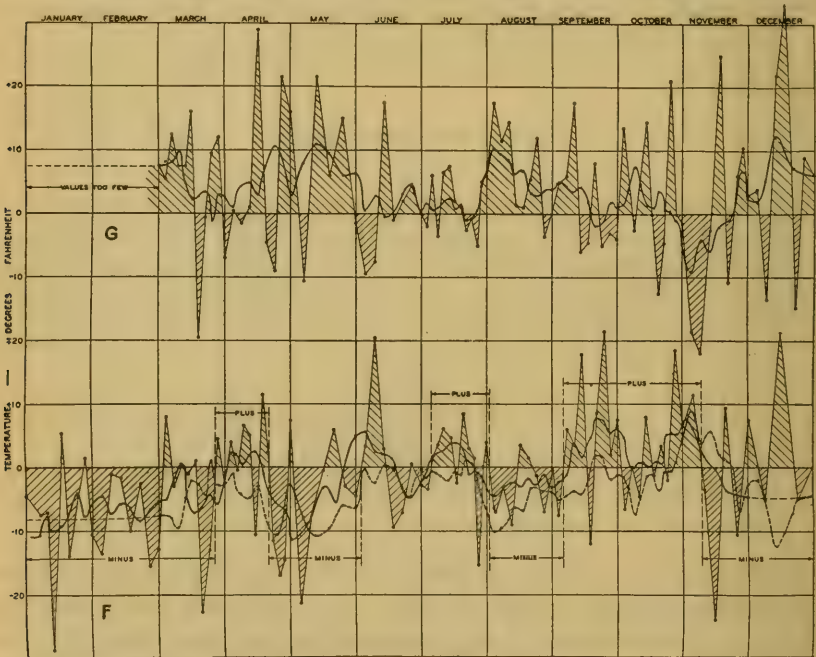


FIGURE 5.—Inversions of temperature dependence on solar variations

of sign at Washington. All the cases have been arranged in consecutive order of days throughout the year, irrespective of what year they occurred. The 98 cases corresponding to ascending sequences are given in Diagram F, and those corresponding to descending sequences in Diagram G. The quantity which is plotted is the difference of temperature between that of the day of culmination of solar change and that of four days previous. To guide the eye as to the prevailing trend of the results, a zigzag line connects the

separate points. The area it includes over the line of zero departures is crosshatched. Obviously the Diagram F has a preponderance of crosshatched area below the zero line, and the Diagram G above. Yet in April, and from June to mid-November, these aspects tend to reverse themselves in each diagram. To bring out this characteristic more plainly, I give in each diagram curves made by taking 5-case consecutive means. That is, the mean is taken of cases 1 to 5, 2 to 7, 3 to 8, and so on. As it seemed clear that such a curve in Diagram G is nearly the reverse of that in Diagram F, I have inverted the 5-day mean curve of G as the dotted curve in F. The correlation coefficient between the full and dotted curves in F is 50 ± 5 per cent.

Results are found for Yuma and Williston similar to those presented for Washington. Though the types of effect do not occur in identical months at the three stations, the magnitudes and tendencies are much the same.

TABLE 1.—*March sequences*

Ascending Sequences

		Washington temperatures and departures, degrees Fahrenheit										Solar constant values and departures (1.9+tabular values)				
Days		-4	-3	-2	-1	0	1	2	3	4		-4	-3	-2	-1	0
1924	DAYS 4 D. T.	-13.0 34.5	-5.5 42.0	-10.0 37.5	-6.5 41.0	0 47.5	+2.5 50.0	-6.0 41.5	-5.5 42.0	-10.0 37.5	D. S. C.	-24 34 S-	-18 40 S	-12 46 S	-11 47 S	0 58 S
	13 D. T.	-0.5 38.5	-3.0 36.0	-4.5 34.5	+1.5 40.5	0 39.0	-6.5 32.5	-7.0 32.0	-3.0 36.0	+1.5 40.5	D. S. C.	-5 45 S	-2 48 S	-12 38 S-	-4 46 S-	0 50 S-
1928	4 D. T.	+8.0 43.5	+3.5 41.0	-0.5 37.0	-1.5 36.0	0 37.5	-4.0 33.5	-5.5 32.0	+6.0 43.5	+6.0 43.5	D. S. C.	-28 28 S-	-----	-12 44 S-	-8 48 U	0 56 S-
	9 D. T.	-5.0 33.5	-6.5 32.0	+5.0 43.5	+5.0 43.5	0 38.5	0 38.5	-0.5 38.0	+7.5 46.0	+11.0 49.5	D. S. C.	-21 40 S-	-16 45 U	-17 44 S	-12 49 S-	0 61 S
	20 D. T.	+1.0 39.5	-1.5 37.0	-2.0 36.5	-3.0 35.5	0 38.5	+2.0 40.5	+11.5 50.0	+17.5 56.0	+21.0 59.5	D. S. C.	-19 37 U	-34 22 S-	-12 44 S-	0 56 S-	0 56 S-
	27 D. T.	+4.5 56.0	+8.0 59.5	+16.0 67.5	+13.5 65.0	0 51.5	-6.0 43.5	-3.0 48.5	-5.0 46.5	-12.0 33.5	D. S. C.	-22 33 S-	-----	-10 45 U	-11 44 S-	0 55 S
1929	24 D. T.	-12.5 56.0	-12.5 56.0	+1.0 69.5	-0.5 68.0	0 68.5	-10.5 58.0	-3.5 65.0	-15.0 53.5	-14.5 54.0	D. S. C.	-8 33 S	-11 30 S	-8 33 S	-4 37 S	0 41 S
	17 D. T.	-6.0 53.0	-14.0 45.0	-20.0 39.0	-11.0 48.0	0 59.0	+3.5 62.5	-8.5 50.5	-12.5 46.5	-15.5 43.5	D. S. C.	-3 40 S-	-8 35 S-	-6 37 S-	-3 40 S-	0 43 S-
	25 D. T.	-13.0 43.5	-24.5 31.5	-18.0 38.5	-7.0 49.5	0 56.5	-17.0 39.5	-14.5 42.0	-12.5 44.0	-9.0 47.5	D. S. C.	-27 31 S-	-24 34 S-	-22 36 S-	-7 51 S-	0 58 S-
	Means	-4.06	-6.28	-3.67	-1.06	0	-4.00	-4.11	-2.50	-2.50	-----	-17	-16	-12	-7	0

TABLE 2.—*March sequences*

Descending Sequences

Days.....		Washington temperatures and departures, degrees Fahrenheit										Solar constant values and departures (1.9+tabular values)				
		-4	-3	-2	-1	0	1	2	3	4	-4	-3	-2	-1	0	
YEAR	DAYS															
1924.....	11 D. T.	+7.5 42.0	+3.0 37.5	+4.0 38.5	+1.5 36.0	0 34.5	+6.0 40.5	+4.5 39.0	-2.0 32.5	-2.5 32.0	+14 52 S	+11 49 S-	+7 45 S	+10 48 S	0 38 S-	
1925.....	18 D. T.	+7.5 57.0	-11.0 38.5	-10.0 39.5	-4.0 45.5	0 49.5	+9.5 59.0	-1.5 48.0	+2.5 52.0	+1.0 50.5	+17 40 S-	+12 35 S-	+19 42 S-	+9 32 S-	0 23 S-	
1927.....	23 D. T.	+16.0 59.0	+5.0 48.0	+9.0 52.0	+7.5 50.5	0 43.0	+4.0 47.0	+14.5 57.5	+15.0 58.0	+11.0 54.0	----- -----	0 28 U	+20 48 U	+10 38 S-	0 28 S-	
1927.....	29 D. T.	-0.5 42.5	+4.5 47.5	+0.5 43.5	+1.0 44.0	0 43.0	+3.0 46.0	+8.0 51.0	+1.0 44.0	-4.0 39.0	+28 45 U+	+36 53 S-	+26 43 U+	+25 42 S-	0 17 S-	
1928.....	11 D. T.	+5.5 43.5	+5.5 43.5	+0.5 38.5	+0.5 38.5	0 38.0	+8.0 46.0	+11.5 49.5	+12.5 50.5	+8.0 46.0	+3 44 S	+8 49 S-	+20 61 S	+5 46 S-	0 41 S	
1928.....	17 D. T.	+12.5 49.5	+13.5 50.5	+9.0 46.0	+2.5 39.5	0 37.0	-0.5 36.5	-1.5 35.5	+1.5 38.5	+3.5 40.5	----- -----	----- -----	+20 42 S-	+15 37 U	0 22 S-	
1928.....	23 D. T.	-20.5 35.5	-17.5 38.5	-15.5 40.5	-6.0 50.0	0 56.0	+3.5 58.5	+11.5 67.5	+9.0 65.0	-4.5 51.5	+23 56 S-	+23 56 S-	+16 49 S	+11 44 S	0 33 S-	
1930.....	31 D. T.	+12.0 51.5	+6.0 45.5	+9.0 48.5	+7.0 46.5	0 39.5	+3.0 42.5	+7.0 46.5	+12.5 52.0	+22.0 61.5	+3 44 S-	+14 55 U	+9 50 S-	-1 40 U	0 41 S-	
1930.....	20 D. T.	+1.5 48.0	+12.5 53.0	+16.0 62.5	+4.0 50.5	0 46.5	-3.0 43.5	-15.0 31.5	-8.0 38.5	+3.0 49.5	+9 40 S-	+12 48 S-	+7 38 S-	+7 38 S-	0 31 S-	
1930.....	29 D. T.	+9.0 56.5	-8.0 38.5	-5.5 42.0	-3.5 44.0	0 47.5	+1.0 48.5	-4.5 43.0	+6.0 53.5	+0.5 48.0	+23 58 S	+12 47 S	+4 39 S	+4 39 S-	0 35 S-	
Means.....		+5.05	+1.35	+1.70	+1.05	0	+3.45	+3.45	+5.00	+3.80	+15	+14	+15	+9	0	

From all this I conclude:

1. An apparent influence of short-period solar variation appears in the temperature of the United States.

2. Corresponding to 0.8 per cent change in the sun, there appear to be temperature changes of the order of 5° F. at Washington.

3. The sign of the correlation changes during the year.

4. A high negative correlation is found between the temperature effects corresponding respectively to rising and to falling solar sequences.

5. The temperature effects coincide in date with the solar changes which appear to induce them.

6. If the connection between solar change and temperature change is a genuine one, it must operate by some indirect atmospheric mechanism; because if it were a direct effect its sign would not change during the year.

7. Although complicated, the relation seems to offer promise for weather forecasting nearly a week in advance. Yet the occasional inversions of effect found inspire caution in a pronouncement of this character. These apparent inversions are, however, doubtless caused frequently by one solar change treading too quickly on the heels of another. Again they may sometimes be caused by delayed receipt from distant centers of action of waves of temperature effect arising from former solar changes.

The results thus far are tentative. It is proposed to study barometric pressures as well as temperatures and to extend the investigation to other parts of the United States and of the world. Preliminary studies have been made, too, of 10-day mean values of solar radiation and temperature, and we hope that in this way, if reliable weather-forecasting data are really secured, they may be extended to months and seasons in advance.

FIELD STATIONS

Observations of the solar radiation have been continued whenever weather conditions would permit at Table Mountain, Calif., at Mount Montezuma, Chile, and at Mount Brukkaros, South West Africa. All three stations continue to report measurements as made on three-quarters of the days of the year or more. However, not all of these observations prove satisfactory, so that 60 per cent is a better estimate of available observation days for these selected high-level desert stations.

A strange and serious accident occurred in December on Mount Brukkaros. It will be recalled that for the sake of uniformity of

temperature conditions our observatories are in the form either of tunnels in solid rock or cemented chambers under ground. In a hard thundershower on January 24, 1930, the interior of the tunnel in the mountain face was struck by lightning, and the bolometer, the resistance box, and other parts of the electric circuit were burned out. Fortunately a second bolometer and some other spare parts were in stock, so that the observer, Mr. Sordahl, by diligence and clever adaptations, was able to restore the circuits so as to recommence observing with the loss of only four days.

Mrs. Sordahl is keeping an interesting daily journal of events, and, having zoological training, is also making a valuable collection of the fauna and flora of the Mount Brukkaros region for the United States National Museum.

PERSONNEL

At Washington, Dr. C. G. Abbot continues as director. Finding himself unable to give sufficiently continuous attention to the work, he appointed Mr. L. B. Aldrich to be assistant director, beginning May 19, 1930; F. E. Fowle, research assistant; W. H. Hoover, associate research assistant (detailed to the Division of Radiation and Organisms); Mr. A. Kramer, instrument maker; Mrs. A. M. Bond, statistical assistant, reinstated October 16, 1929, vice Miss M. Marsden, resigned October 10, 1929; Mrs. M. D. (Denoyer) Johnson, computer; Mr. W. Oliver Grant, assistant computer.

In the field: Mr. A. F. Moore, field director, Table Mountain, Calif.; Mr. F. A. Greeley, bolometric assistant, Table Mountain, Calif.; Mr. H. H. Zodtner, field director, Montezuma, Chile; Mr. C. P. Butler, bolometric assistant, Montezuma, Chile; Mr. L. O. Sordahl, field director, Mount Brukkaros, South West Africa; Mr. A. G. Froiland, bolometric assistant, Mount Brukkaros, South West Africa.

SUMMARY

This year has been notable for both disappointment and achievement. Disappointment—because the high hopes of satisfactory accuracy raised by preliminary results of reduction of observations at Table Mountain proved to some extent illusory, and have given place to tests of new methods designed to remove more effectually atmospheric sources of error. Achievement—in the invention of a new method of determining the amount of atmospheric ozone, applicable on every day in which solar radiation observations have been made; in the discovery of the apparently large and exceptionally important

influence exercised by small short-interval solar variations on terrestrial temperatures; and for the continuation under favorable auspices of observing at the station on Mount Brukkaros, South West Africa.

Respectfully submitted.

C. G. ABBOT,

Director, Astrophysical Observatory.

THE SECRETARY,

Smithsonian Institution.

APPENDIX 8

REPORT ON THE DIVISION OF RADIATION AND ORGANISMS

SIR: I have the honor to submit the following report of progress made by the new Division of Radiation and Organisms during its first year of existence.

The purpose of the division is to undertake those investigations dealing with radiation bearing directly, or indirectly, upon biological problems. The central idea in the development of the division is to build up an especially strong spectrophotometric laboratory, with a staff of experienced physicists and technicians to work cooperatively with men of biological training. Problems undertaken fall into two classes:

1. Direct investigations upon living organisms.
2. Fundamental molecular structure and photochemical investigations related to the biological problems.

Briefly, the following developments have taken place. Basement space in the Smithsonian Building, previously used for storage, has been reconstructed into a modern physical, chemical, and biological laboratory. Equipment has been purchased, and the laboratory appointed. Offices have been furnished and developed in the north tower. A small staff of investigators, of highly specialized training in the various allied fields, has been assembled. Plans have been made, and equipment partially developed for growth of plants under controlled conditions. A preliminary experiment upon the phototropic bending of plants has been carried to completion with interesting results. Equipment has been assembled for a more extensive experiment in this field. In cooperation with the Fixed Nitrogen Laboratory, the near infrared investigation of the halogen derivatives of benzene has been completed.

Arrangements for cooperation with the Department of Agriculture, in carrying out an experiment on the effect of light upon the rooting of Citrus cuttings and the growth of palms, have been consummated. In cooperation with the Research Corporation, staff and shop have been provided for instrumental development.

DEVELOPMENT OF LABORATORY

The initial drafting of plans for the development of the space assigned to the division was begun May 1, 1929. By July 1, the actual work of reconstruction, transforming the empty basement into a laboratory, was under way. Room No. 18, the largest of the three rooms originally assigned, some 60 feet long by 20 feet wide, was planned to accommodate the main plant experiments and spectroscopic work in the visible region. Three small constant temperature rooms were divided off for photometric and phototropic measurements, and control instruments. Provision was made for experiments dealing with the growth of plants under controlled conditions in one end of the long laboratory space remaining. The other end was arranged for the spectroscopic study of the sources of light required in these experiments. Room No. 17, one of the two smaller rooms, was subdivided into two parts, the larger portion, some 16 by 16 feet, was equipped with soapstone sinks, hood, furnace, still, etc., for a chemical laboratory. This is required for the preparation of nutrient solutions which replace the soil in the growth of plants, for desiccating and weighing the plants, for the incidental chemical phases of other experiments, and later, for the photochemical experiments which may be undertaken. The smaller part of room 17, about 9 by 16 feet, has been equipped for glass blowing and related technical construction. Room 16, used prior to the completion of the space in the tower as office and drafting room, was subsequently subdivided into a large laboratory space and two small constant-temperature rooms for infra-red work.

Throughout the laboratory, with the exception of the glass-blowing room, the windows were provided with light-proof curtains, so that the experiments could be carried out in the absence of daylight when required. Plumbing and heavy electrical installations were made so that service would be conveniently available for the experiments. This service includes gas and air, 110 and 220 volts, both alternating and direct current. Alternating current, not previously available in the Smithsonian, was brought in by way of the Freer Building. A special gas booster was installed to provide gas under sufficient pressure for the glass blowing of large pyrex apparatus. A large battery was installed, together with heavy leads for special constant-light sources in the photometer room, and also in the infra-red laboratory. All this general reconstruction, including carpentry, masonry, electrical wiring, plumbing, and painting, as well as the construction of special tables, was carried out either by, or under the direction of, the Museum organization, to whom the division is greatly indebted for the unusually fine laboratory resulting. The

extensive reconstruction of the laboratory space was finally completed toward the end of February, 1930.

The detailed appointment and equipment of the laboratory proved to be a tremendous undertaking, particularly so, because of the border-line character of the proposed investigations. Although the laboratory is not unusually large, provision had to be made for physical, chemical, and biological fields of experimentation. By the middle of July the volume of correspondence involved was such as to require the whole time of a stenographer, thus leading to the employment of Miss Stanley. Mr. Clark, who joined the staff August 1, was of the greatest assistance in the selection of equipment, because of his wide experience in technical fields. During the entire year, a very large part of the director's time was devoted to this phase of the work.

INITIATION OF EXPERIMENTS

In spite of the construction work which was continuously in progress, steps were immediately taken toward beginning experimental work.

PLANT GROWTH EXPERIMENTS

Arrangements were made with Maryland University for Doctor Johnston, plant physiologist, to serve in consulting capacity, spending three one-half days a week at the Smithsonian. In collaboration with Doctor Johnston, plans were drawn up for a large pre-conditioning chamber in which plants could be grown where the individual plants would be under identical conditions, and, at the same time, the humidity and temperature held at a definite point. Plans were also drawn up for individual growth chambers to be mounted in two groups of four. These small growth chambers were to be water-cooled and gas-tight, so as to permit of the rigid control of the atmospheric constituents, as well as temperature and humidity. Windows were introduced for both lateral and overhead illumination. The bases were equipped with adapters for gas-tight connection between the chamber and Mason jars for the nutrient solutions. As the division had no shop facilities, beyond such work as could be carried out as an accommodation through the courtesy of the National Museum and the Astrophysical Observatory, most of the construction had to be arranged for with private concerns. With the growth chambers themselves completed, the extensive development of apparatus for supply and control had to be suspended in March, 1930, for lack of funds. Near the end of the year, in anticipation of new funds on July 1, orders were placed for manifold systems and other equipment required in completing the first set of four chambers.

As artificial light, because of its possibility of rigid control, is used to replace sunlight in most of these experiments, the problem of construction of such special sources becomes a considerable part of the undertaking. Because of his extensive experience in the commercial construction of Neon lamps, as well as his unusual skill in glass blowing, Mr. Clark was added to the staff. By October 1, his glass-blowing laboratory was sufficiently complete to permit the commencement of construction of high vacuum systems to be used in the evacuation of special lamps and thermocouples. The constructive development of these sources will, undoubtedly, be a matter of experimentation which will extend over several years.

PHOTOTROPIC EXPERIMENTS

As it was early realized that the construction of special growth chambers would be an undertaking extending probably to two years, and undoubtedly requiring more funds than were immediately available, another experiment dealing with the bending of plants in the presence of light was undertaken. This experiment could be carried out through the preliminary stages with equipment immediately at hand. A long constant-temperature room, constructed out of a portion of room No. 18, as has been mentioned, was ideally suited to this purpose. For this phototropic experiment a special photometer box was constructed. Two beams of light, originating at the extremities of the box, played from opposite sides on a central plant. By the introduction of water-cooled filters, these beams were restricted to a narrow range of visible radiation, and provision was made for four possible colors of light.

Even before the completion of the laboratory, actual observations on the phototropic influence of different colors were being made. It was found immediately that beams of equal intensity but different color affected the bending of the plant in markedly different degree. A thermocouple was provided so that by the galvanometer deflection an accurate determination could be made of the relative intensities of the two beams. By adjusting the beam whose color had the lesser influence, its intensity could be increased until a balance was secured against the weaker, but more potent radiation, so that the plant would grow vertically without bending.

Early in the experiment it was realized that the most important disturbing factor was the presence of small temperature fluctuations in the air surrounding the oat sprout whose bending was being observed. After many failures to remove this source of disturbance, which vitiated many of the early observations, a scheme was devised which overcame the difficulty. A double-walled cylindrical glass shield was placed around the sprout, symmetrically, and maintained in continual rotation. Thus, if one side were unevenly heated, its

influence would be carried around so that it was felt equally from all sides. Ultimately, this only proved completely effective when the space between the double walls of glass was filled with water.

In order to determine the wave-length range transmitted by the filters used in the phototropic experiment, spectrograms, secured through the cooperation of the Fixed Nitrogen Laboratory, were taken. These showed the varying amounts of light transmitted by the filter from an incandescent bulb of the type used in the experiment. In order to interpret the spectrograms, a self-registering microphotometer, previously secured by the Astrophysical Observatory, was set up in one of the small constant-temperature rooms. Curves were thus obtained, representing the relative transmission of these filters for the various wave lengths, and so determining definitely the region of the spectrum, or colors, used.

Completion of this preliminary experiment in September of 1930, yielded the following facts: First, that red, or infra-red light, produced no measurable effect; second, that yellow light of the type used, produced a small, but measurable bending; third, that the green light was one thousand times (+ or -2 per cent) more effective than yellow; and finally, that blue light of the range used was thirty times more effective than the green, or thirty thousand times more effective than the yellow.

The outstanding points of interest resulting from the preliminary experiments are two: First, the quantitative reproducibility of the ratios obtained, that is, within 5 per cent of the magnitudes quoted; second, the tremendous ratio observed between yellow and green, together with rapid increase of the effect as one proceeds to shorter wave lengths, tends to indicate a definite threshold wave length at which the phototropic influence shows itself. This is typical of photochemical reactions involving an electronic change of energy. The conclusions drawn from this observation are of far-reaching importance, as this constitutes crucial evidence against any theory which seeks to explain phototropism as merely a thermal effect due to unequal absorption of radiant energy.

The preliminary results of this experiment proved so interesting, even at the early stages, that steps were immediately taken to prepare for a more elaborate experiment. Mr. Hoover, returning from extensive field experience with the Astrophysical Observatory, was assigned to the work of the division in December, 1929. An experienced observer himself, much of the successful carrying out of this phototropic experiment is due to his efforts.

The things which immediately suggest themselves as desirable in a new experiment are, first: To use a narrower wave-length range, or a purer color, in order to determine what wave lengths have a particular effect, and second; to use a larger number of different

wave-length regions, or colors, to determine where in the spectrum the phototropic influence begins as one proceeds to shorter wave lengths that is, from red to blue. For this purpose suitable screens are not available and one must, therefore, turn to a monochrometer. Such a monochrometer would be used, on the one side, to furnish all the different possible wave lengths or colors, while on the other, a single standard comparison source would be used. The phototropic influence of all the various wave lengths, would be expressed in terms of a single standard. As has been seen in the preliminary experiment, some thirty thousand times variation in phototropic effect is to be observed. The comparison light, must, therefore, be varied in intensity over a large range. For this purpose an optical bench has been purchased. By means of this bench, the comparison light may be varied by varying the distance from the plant over a range of three meters. Since the intensity of light varies inversely as the square of the distance from the source, this permits a tremendous range of possible intensities. As funds were not available for the purchase of a monochrometer, plans were made for the construction of an instrument from optical parts available in the Smithsonian. Lenses belonging to the National Museum, and originally used as projectors, were loaned to the division for the construction of this monochrometer. A prism and mirror were loaned by the Astrophysical Observatory. A spectrometer bearing of a novel type, involving an inverted cone with a ball thrust, was constructed by Mr. Kramer in the Astrophysical Observatory shop. Because of the pressure of other work in the shop, this monochrometer, begun in February, was not completed until August of 1930. Preparations for this more extensive experiment are now nearing completion.

COOPERATION

During the second half of the year, Doctor Weniger from Oregon State College came to the laboratory and undertook the development of more sensitive radiometers for the Astrophysical Observatory. The facilities of the laboratory, and a considerable part of Mr. Clark's time were placed at his disposal. At the termination of the 6-month period, it was necessary for Doctor Weniger to return to his position in charge of the Physics Department at Oregon State College. The completion of the development of these new radiometers is, however, still in progress in his laboratory at Corvallis, Oreg. The radiometers, when finally developed, will not only be of unusual value to the Astrophysical Observatory in its study of stellar radiation, but also to the Division of Radiation and Organisms in its contemplated work in the infra-red spectrum upon the molecular structure of polyatomic molecules.

It will be noted, in this roughly chronological discussion of the work of the year, that the only experiments mentioned came under the first head of direct experimentation on living organisms. Some progress, however, has been made under the second head in the subdivision dealing with molecular structure. Due to the lack of funds and shop facilities, it was impossible to undertake any of this work at the Smithsonian. The only steps taken in that direction were, first: The construction of two large tanks which will be used for vacuum spectrograph bodies, and, second, the provision of special room space in the reconstruction of the basement. Fortunately, however, through the very generous cooperation of the Fixed Nitrogen Laboratory, work begun at the Fixed Nitrogen Laboratory by Doctor Brackett during the four months previous to his appointment by the Smithsonian, has been continued during the past year. Mr. Liddel, appointed as a junior chemist on its staff, has actively pushed the research work contemplated under the direction of and in cooperation with the Smithsonian. The first work undertaken, namely, the study of the near infra-red absorption spectra of the halogen derivatives of benzene, has been carried through to completion so far as available materials and equipment permit. Predictions made in the study of the paraffines in regard to the wave-length position of the absorption due to vibration of hydrogen with respect to carbon, have been borne out in the case of the phenyl derivatives. The position of the second overtone of this vibration promises to furnish an interesting basis for determining the binding forces upon the hydrogen atoms in different positions in the various organic compounds. The work will be extended during the coming year, largely to nitrogen compounds of a more immediate interest to the Fixed Nitrogen Laboratory, and, at the same time, of great importance in biological connections.

Photochemical work bearing on biological problems can not be undertaken until additional financial support can be obtained. In the infra-red spectroscopic analysis, undertaken at the Fixed Nitrogen Laboratory because of its bearing upon the problems of molecular structure, the range of spectrum which can be studied is limited by the transmission of glass of which the prisms are constructed. It has been the plan to build, at the Smithsonian, spectrographs in which prisms of salt will be used. This will permit the extension of the infra-red investigations from $2\frac{1}{2}\mu$ to 15μ . A more complete understanding of the structure of polyatomic molecules will depend upon securing the information from these regions of longer wave lengths, as the most complete possible data upon vibration wave lengths must be secured if progress is to be made. The actual construction of instruments for this purpose was more or less indefi-

nately postponed for lack of funds and shop facilities as well as laboratory staff. Arrangements for meeting this situation were finally completed toward the end of the fiscal year.

In such an undertaking of border-line investigation, it is not surprising that cooperation should have become a matter of unusual importance. Not only is the division cooperating closely with the University of Maryland in the plant physiological side, with the Fixed Nitrogen Laboratory in the molecular structure work, with the Research Corporation in instrumental development, but also, in a large degree with other bureaus of the Department of Agriculture. Extensive plans have been developed, and something over \$1,800 appropriated by the Department of Agriculture for investigation of the effect of various radiation conditions upon the rooting of Citrus fruits and the growth of date palms. This work is under the sponsorship and cooperative direction of Doctor Swingle. It is proposed to complete the second group of four individual growth chambers for that purpose.

PERSONNEL

During the fiscal year the personnel was as follows:

Research associate in charge, Dr. F. S. Brackett.

Consulting plant physiologist, Dr. Earl S. Johnston.

Research assistant, L. B. Clark.

Research assistant assigned by Astrophysical Observatory, W. H. Hoover.

SUMMARY

A well balanced and efficient laboratory has been developed. The essential nucleus of a staff has been assembled. An experiment in each of the main fields has been carried through to completion with interesting results. Essential cooperations of a mutually profitable character have been established. Foundations have been laid for extensive investigations of importance in the fields of biophysics and molecular structure. Preparations have been made for making generally available specialized instruments developed by the division.

Respectfully submitted.

F. S. BRACKETT,

Research Associate in Charge.

Dr. C. G. ABBOT,

Secretary, Smithsonian Institution.

APPENDIX 9

REPORT ON THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE

SIR: I have the honor to submit the following report on the operations of the United States Regional Bureau of the International Catalogue of Scientific Literature for the fiscal year ending June 30, 1930.

Since publication of the catalogue was suspended by the London Central Bureau, owing to advanced costs in printing and the inability of the cooperating European countries to meet these advances with their depreciated and unstable financial resources, it has been the policy of this bureau to spend only so much of its annual congressional appropriation as is necessary to keep the organization alive pending the time when reorganization is possible and publication can be resumed. The gross expenditure for the past year was \$5,457.96 out of the appropriation of \$7,885.

In the several preceding reports conditions affecting the catalogue due to the late war were noted, and in the last report definite suggestions were made regarding possible means of refinancing the enterprise and estimates of the sum needed were submitted. Owing to the still unsettled political and financial conditions abroad, no definite scheme for reorganization has yet been submitted by the director of the central bureau or the chairman of the executive committee, in whom authority for this purpose is vested.

The proposals looking toward reorganization made in the last annual report were discussed in an article entitled "The International Catalogue of Scientific Literature Again," by Dr. Ernest Cushing Richardson, consultant in bibliography and research, Library of Congress, published in "Science," June 20, 1930 (Vol. LXXI, No. 1851 pp. 635-637), and as Doctor Richardson is one of the great international authorities on bibliography and on the needs of librarians it is thought advisable to quote at length his remarks, hoping thereby to aid the effort being made to refinance the catalogue.

THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE AGAIN

The proposal suggested by the Smithsonian Institution to revive the publication of the International Catalogue of Scientific Literature on a very modest but well-considered budget is a challenge to all scientists and librarians, and to all trust agencies which are spending good money for the promotion of research.

It is suggested that a revolving fund of \$75,000 and 1,000 library subscriptions of \$50 for 17 volumes will insure the enterprise. Whether or not this is enough is a detail. If this catalogue or something like it is an indispensable tool for research, as many first-class scientists seem to think, then any necessary amount should and probably can be had. If the catalogue is not needed, too much money is now being spent on it. Why waste more?

The Smithsonian raises this question plainly. Why ask the American Government to continue to appropriate six or seven thousand dollars a year in the procrastinated hope of a resurrection, if the project is better dead? If it is needed, why procrastinate?

By putting the question the Institution has deserved the thanks of all concerned. It is to be hoped that it will not let the matter rest until it has a square answer from all responsible parties. * * *

* * * The question raised by the Smithsonian is not the question of presenting a new project to be justified, financed and initiated, but whether perfectly good machinery worth at least \$3,000,000 is to be scrapped, in an enterprise bound to be revived sometime, as Professor Armstrong, of the Royal Society, prophesies and as many scientific bibliographers in many countries are on record as believing.

It is at this point that the overture of the Smithsonian becomes a matter of practical business concern both in the research trust endowments and to the libraries. The research endowments are bombarded with bibliographical projects of varying method and degrees of merit. They aid or support a good many projects. They are deeply concerned as trust organizations to put their money where it will do the most good. Other things being equal they prefer to put it where one dollar will do the work of four. This seems to be a spot where one million, perhaps a quarter of a million, will do the work of four millions. If its usefulness merely averages with these other projects the endowments are likely to feel that its claims come first. It is here they can give the most bibliographical service with the least money. The proposition touches the libraries in a very similar way. If and when the matter is revived it will depend for financing, if not on the endowments, then on library subscriptions. If this machine is scrapped, when a new one is started either a \$3,000,000 endowment must be had from promoters of research or a quadruple price charged to libraries.

This leads straight to the crucial question of whether the international catalogue is in fact a primary, essential or indispensable tool in such sense that it is bound to be revived sometime. It no doubt seems a futile and mortifying matter to those who have been deeply engaged in the problem for 30 years that they should have to rejustify and refight a matter which was fought to the finish 30 years ago. But it is fair enough. It is not the only real bibliographical need of science. There are at least two other equally well-defined needs—abstracts and handbooks. Without disparaging the usefulness of these two other tools, it must be confessed that a good case is made by those who claim that something like the international catalogue is the essential and only indispensable tool among the three types.

A dispassionate general bibliographer must recognize that this is a conclusion towards which the whole history of bibliographical experience tends. The complete survey, in full title form, of the whole literature of any subject or group of subjects is the only solution of the main need of the student in research and in the higher learning, that is, completeness, and the best solution as to his need for a perspective. * * *

In short, bibliographical experience confirms the judgment that something "very like" this catalogue as to completeness is the essential, and full title method best, without prejudice as to variety in other details. * * *

Scientific bibliography has the very high honor in bibliographical history of having been the first to conceive and to carry out on a large scale in the international catalogue the seeing-as-a-whole aspect of things which the modern school of psychologists is now exploiting. It would be an even greater honor if it should lead the promoters of research generally to apply the comprehensive method to other large fields.

Notwithstanding the practical deadlock still existing in international relationships, where cooperation is essential to success, it is hoped and expected that some method will be found to reorganize and finance this great enterprise, as its history and past success entitles it to first place when worth-while projects are being considered by private individuals or by existing foundations whose aim and purpose is to aid the advance of knowledge and the welfare of mankind.

Respectfully submitted.

LEONARD C. GUNNELL,
Assistant in Charge.

DR. CHARLES G. ABBOT,
Secretary, Smithsonian Institution.

APPENDIX 10

REPORT ON THE LIBRARY

SIR: I have the honor to submit the following report on the activities of the library of the Smithsonian Institution for the fiscal year ended June 30, 1930:

THE LIBRARY

The Smithsonian library, or library system, is composed of the 10 major and 36 minor libraries of the Institution. It numbers somewhat more than 800,000 volumes, pamphlets, and charts, of which many are on art, literature, history, music, and philosophy, but most on science and technology. The system is especially strong in serial publications and in the reports, proceedings, and transactions of the learned societies and institutions of the world. The major units are the Smithsonian deposit in the Library of Congress, the Smithsonian office library, the Langley aeronautical library, and the libraries of the United States National Museum, the Bureau of American Ethnology, the Astrophysical Observatory, the National Gallery of Art, the Freer Gallery of Art, the Division of Radiation and Organisms, and the National Zoological Park. The minor units are the sectional libraries of the National Museum. The system, with its highly specialized collections, the gathering of which has been proceeding since 1846, the date when the Smithsonian began its work, has brought to the Institution and through it to the Government and to American scholars generally the results of the research of the world during its most important scientific era, and thus has contributed not a little to the fulfilment of the purpose for which the Institution was founded, namely, that of increasing and diffusing knowledge among men.

CHANGES IN STAFF

A number of changes occurred in the staff. Miss Isabel L. Towner, assistant librarian in the National Museum, after several years of noteworthy service, resigned to accept an editorial position in New York. She was succeeded by Miss Leila G. Forbes, a graduate of St. Lawrence University and of the Pratt Library School, who had been for many years librarian of Randolph-Macon Woman's College.

Miss Ethel A. L. Lacy, assistant librarian in the National Museum, also resigned to take a position in another Washington library. Her

place was filled by the appointment of Miss Gertrude L. Woodin, a graduate of Wellesley College and of the Albany Library School, who had been for some time a junior librarian on the roll of the International Exchanges. Mrs. Hope Hanna Simmons, junior library assistant in the National Museum, was promoted to the vacant junior librarianship. Mrs. Mary Arnold Baer, under library assistant in the Museum, was advanced to Mrs. Simmons' former position. Miss Margaret Moreland, a graduate of the library science department of George Washington University, who was already serving temporarily on the roll of the International Exchanges, was selected to succeed Mrs. Baer.

Miss Anna M. Link, a former teacher, and at present a student of library science at George Washington University, was appointed to the position of minor library assistant in the Astrophysical Observatory. Mr. William O. Grant, assistant messenger in the National Museum, was given a better position elsewhere in the Institution, and Mr. Stephen Stuntz took his place. The temporary employees were Mr. Alan Blanchard, Mrs. Daisy Cadle, Miss Rosalie Dimmette, Miss Katherine Everhart, Miss Angela Moore, Miss Margaret Moreland, Mrs. M. Landon Reed, Miss Jennette Seiler, Miss Eleanor Spielman, and Mrs. M. Frances Watkins.

EXCHANGE OF PUBLICATIONS

In the early days of the Institution the accessions to the library usually came by purchase, gift, or copyright—for in those days the copyright law provided that one copy of each new book published in the United States should be deposited in the Library of Congress and one in the Smithsonian library. Increasingly, however, since that time the accessions have come by exchange of publications with editors of journals and with learned institutions and societies, until now, while some are still obtained by purchase and gift, by far the greater number are received in exchange. Many of the latter come through the United States International Exchange Service, which is administered by the Institution.

During the fiscal year just closed the Smithsonian library received 24,063 packages by mail and 2,077 through the Exchange, each containing one or more publications. These were stamped and entered—with the exception of the documents from foreign governments—and assigned to the units of the library system in which they would be of most use in furthering the work of the Institution and its branches, but chiefly, of course, to the Smithsonian deposit and the library of the National Museum. There were a number of unusually large sendings, the largest being one of 208 pieces from the Academy of Sciences at Heidelberg. This went far toward completing the set of the Academy's publications in the deposit.

Among the items received were several thousand dissertations from the universities of Basle, Berlin, Bern, Bonn, Breslau, Budapest, Erlangen, Freiberg, Giessen, Greifswald, Halle, Heidelberg, Helsingfors, Jena, Johns Hopkins, Kiel, Königsberg, Leipzig, Lund, Marburg, Neuchâtel, Pennsylvania, Rostock, Strasbourg, Tübingen, Utrecht, Würzburg, and Zürich; and from technical schools at Berlin, Bonn, Braunschweig, Delft, Dresden, Freiberg, and Karlsruhe.

Most of the 1,711 letters written by the library staff during the year—which, by the way, represented an increase of about 400 over the previous year—had to do with the acquisition of this material. Many of these involved careful checking of sets and reviewing of earlier correspondence. Some proposed or accepted exchange for new publications. This gratifying increase in the number of letters written by the library was effected largely by the recent reorganization of the accessions department. As the immediate result of this increase the exchange correspondence of the library was brought practically up to date. Most of the letters were prepared in response to special requests for publications needed by the Smithsonian deposit and the libraries of the National Museum and the Astrophysical Observatory. The number of items thus obtained was 2,928.

GIFTS

As usual, there were many gifts. The largest one came from Mr. James Townsend Russell, jr., honorary collaborator in old world archeology in the National Museum, who presented to the Institution 1,400 volumes on different subjects, together with a collection of music. These will be assigned mainly to the Smithsonian deposit, the office library, and the libraries of the National Museum and the National Gallery of Art. About 150 volumes and 1,000 periodicals, chiefly on aeronautics, came from the National Aeronautic Association; and 2,000 or more miscellaneous scientific publications from the American Association for the Advancement of Science, the American Association of Museums, the Anthropological Society of Washington, the Geophysical Laboratory, the Hygienic Laboratory, the International Catalogue of Scientific Literature, the Philosophical Society of Washington, and the Library of Congress. Another important gift was that of 58 volumes on Japanese history and literature, from the Historiographical Institute, Tokyo.

Among other gifts were 60 volumes, largely in the field of mining engineering, from Mr. A. F. G. Lucas, and copies of the following: *Mythology of All Races*, volumes 2, 3, 4, 7, 8, and 11, by various authors, from the Archaeological Institute of America and the Marshall Jones Co., of Boston; *The Birds of Tropical West Africa*, volume 1, by David Armitage Bannerman, from the Crown Agents for the Colonies on behalf of the Governments of Gambia, Gold

Coast, Nigeria and Sierra Leone; Milestones, 1830-1930, from the Boston Society of Natural History; The Life and Work of George H. Corliss, by the American Historical Society, from Miss Mary Corliss; A Narrative of Colonel Ethan Allen's Captivity, Containing His Voyage and Travels Written by Himself, from the Fort Ticonderoga Museum; Taking One's Own Ship Around the World, by William K. Vanderbilt, from the author; The Naturalist in Nicaragua, by Thomas Belt, from Mr. Michael J. Clancy; An Early American Queen Anne Escritoire, 1715-1730, by Ross H. Maynard, from the author; Air Pioneering in the Arctic—the Two Polar Flights of Amundsen and Ellsworth—by Lincoln Ellsworth, from the author; Archaeologia Orientalis, volume 1, Prehistoric Sites by the River Pi-liu-ho, South Manchuria, by Kosaku Hamada, from the Far-Eastern Archaeological Society, Tokyo; Av Hvalfangstens Historie, by Sigurd Risting, from the author; The Genealogical Record of the Schwenkfelder Families, edited by Samuel K. Brecht, from Mr. Wayne C. Meschter; Memorials of Peter A. Jay, compiled by his great-grandson, John Jay, from Mrs. John Jay; An Introduction to Biblical Archaeology, by George S. Duncan, from the author; The Barbary Voyage of 1638, Now first Printed from the Original Manuscript of Sir George Carteret, from Mr. Boies Penrose; History of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne, 1829-1929, by T. Russell Goddard, from the Society; Smithsonian Scientific Series, Patrons' Edition, volumes 5 and 6—Insects, Their Ways and Means of Living, by R. E. Snodgrass, and Wild Animals In and Out of the Zoo, by W. M. Mann—from the Smithsonian Institution; Catalogue of Madreporarian Corals, Volume VII—A Monograph of Recent Meandroid Astræidæ—by George Brook and H. M. Bernard, from the British Museum; Researches in Prehistoric Galilee, 1925-1926, by F. Turville Petre, and A Report on the Galilee Skull, by Sir Arthur Keith, from the British School of Archaeology in Jerusalem; and United States Geological Exploration of the Fortieth Parallel, 1870-1880, volumes 1-7, with Geographical and Topographical Atlas, by Clarence King, from Mrs. Frederic V. Abbot.

Donors on the staff of the Smithsonian Institution were Secretary Abbot, Assistant Secretary Wetmore, Dr. William H. Holmes, director of the National Gallery of Art, Dr. Marcus Benjamin, Mr. A. N. Caudell, Mr. A. H. Clark, Mr. P. E. Garber, Dr. J. W. Gidley, Dr. O. P. Hay, Dr. Aleš Hrdlička, Mr. N. M. Judd, Dr. W. R. Maxon, Dr. G. S. Miller, Mr. A. J. Olmsted, Miss Mary J. Rathbun, Mr. W. de C. Ravenel, Dr. C. W. Richmond, Mr. J. R. Riley, Mr. J. T. Russell, jr., and Dr. W. L. Schmitt. Mrs. Charles D. Walcott also gave the library a number of publications.

SMITHSONIAN DEPOSIT

The Smithsonian deposit in the Library of Congress is the main unit in the library system of the Institution. It dates from 1866, when for various reasons Congress granted authority to the Smithsonian to deposit its library of 40,000 volumes in the Library of Congress. Since that time the collection has been steadily increased by sendings from the Institution until it now numbers more than a half million volumes, pamphlets, and charts, together with thousands of volumes still uncompleted. The deposit comprises works relating to many branches of knowledge, but chiefly to the natural and physical sciences, and includes a collection of scientific serials and of the publications of learned institutions and societies that is unique for completeness among groups of its kind. Most of the items have come to the Institution during its 80 years and more of existence in exchange for its publications and those of the Government bureaus under its direction. In 1900 the Library of Congress established a special division, known as the Smithsonian division, to take charge of the scientific publications in the deposit, as well as of similar works belonging to the library itself. The rest of the publications are shelved in the other divisions of the library according to subject. It follows that the Smithsonian deposit is not, as many have supposed, synonymous and coextensive with the Smithsonian division.

In the course of the year just closed the library of the Institution forwarded to the deposit 19,144 publications, consisting of 2,720 volumes, 11,802 parts of volumes, 4,352 pamphlets, and 270 charts. Among these were 2,205 publications that the Smithsonian library had obtained in exchange for the deposit, in response to want cards sent from the order division, periodical division, and Smithsonian division, or more than two and one-half times the number obtained in the fiscal year 1929 and nearly five times the number in 1928. Among them, too, were 4,484 dissertations. The library also forwarded 13,729 documents of foreign governments, without stamping or entering them, to the division of documents. The total number of publications, therefore, added to the Library of Congress during the year by the Smithsonian library was 32,873—an increase of nearly 10,000 over the year before. This noteworthy increase, which was due primarily to the reorganization of the accessions department already referred to, was due also, in no small measure, to the hearty cooperation the library staff received from those in immediate charge of the various divisions of the Library of Congress chiefly concerned, notably the Smithsonian division.

NATIONAL MUSEUM LIBRARY

The library of the United States National Museum, which consists of two major collections—namely, on natural history and technology—shelved respectively in the Natural History Building and the Arts and Industries Building, and of 36 minor collections scattered among the various sections of the Museum, is, next to the Smithsonian deposit, the largest and most important unit in the Smithsonian library system. It numbers 76,879 volumes and 108,297 pamphlets. During the last fiscal year it was increased by 2,317 volumes and 668 pamphlets. Most of these came in exchange, but many were purchased and some were received as gifts.

The staff had a very busy year. They entered 8,805 periodicals, catalogued 1,146 volumes and 856 pamphlets, and added 4,493 cards to the catalogue of the natural history library and 295 to that of the technology library. They assigned to the sectional libraries 5,622 publications, and lent to the Museum staff and other Smithsonian employees 7,745, of which 2,820 were charged at the recently established loan desk in the Arts and Industries Building. Of the loans, 1,889 were borrowed from the Library of Congress and 246 elsewhere. The number of publications returned to the Library of Congress was 2,250, and to other libraries 241. The loans to Government libraries and to libraries outside of Washington were 181. Among the latter were those of the American Museum of Natural History, the New York Botanical Garden, and the Department of Agriculture, Ottawa, Canada, and of the following colleges and universities: Buffalo, California, Goucher, Harvard, Johns Hopkins, MacMaster (Toronto), Massachusetts Institute of Technology, Minnesota, North Carolina State, Princeton, and Tennessee. The number of volumes prepared for binding was 2,071, of which 1,271 were bound. The others will be sent to the bindery when additional funds become available early in the next fiscal year. This work entailed considerable checking of sets, collating, and correspondence. In this connection it is of interest to note that the library was able to obtain, without expense, 668 volumes and parts lacking in its sets by writing special letters to the journals and learned societies concerned.

The reference use of the library, not only by those connected with the Smithsonian Institution and the different branches of the Government, but also by students and the public in general, increased somewhat over that of the year before and necessitated a corresponding increase of work on the part of the staff. Hundreds of inquiries for information of various kinds were received and answered. To the technology library alone, with its 700 visitors for the year, out-

side of the Smithsonian employees, came about 225 such inquiries, while to the natural history library came many more.

The sectional libraries, which number 36, are the immediate working tools of the curators and their assistants. Many of them are rich in highly specialized material, much of which has not been catalogued. These libraries present other problems, too, that are pressing for solution, and one of their most urgent needs is of two assistants who can be detailed from the main library to spend their full time looking after the interests of these smaller but very important library units. During the past year it was possible for the library staff to find time for only a few pieces of work in these libraries, such as preparing 2,680 cards for the pamphlet collection in the division of mammals, aiding the department of geology in increasing quite materially its set of the publications of the various State geological surveys, and cooperating with the scientific staff of the division of plants in reorganizing the library of that division, especially by arranging 10,000 cards for its reference file and getting the John Donnell Smith botanical collection ready for transfer to its shelves. This included the making of a catalogue of the collection.

These libraries are as follows:

Administration.	Marine invertebrates.
Administrative assistant's office.	Mechanical technology.
American archeology.	Medicine.
Anthropology.	Minerals.
Biology.	Mineral technology.
Birds.	Mollusks.
Botany.	Old World archeology.
Echinoderms.	Organic chemistry.
Editor's office.	Paleobotany.
Ethnology.	Photography.
Fishes.	Physical anthropology.
Foods.	Property clerk's office.
Geology.	Reptiles and batrachians.
Graphic arts.	Superintendent's office.
History.	Taxidermy.
Insects.	Textiles.
Invertebrate paleontology.	Vertebrate paleontology.
Mammals.	Wood technology.

OFFICE LIBRARY

The office library serves Smithsonian employees in two ways. It keeps constantly on hand in the administrative offices, reading rooms, and other convenient places many works of general reference, including dictionaries, encyclopedias, atlases, and sets of Smithsonian and other learned publications; it also provides material, to a limited

extent, of a less technical character, designed mainly for a cultural and, in some instances, even a recreational purpose. Most of the publications in the latter group have been received as gifts from employees of the Institution or from friends outside. During the last year several hundred such publications were given to the Institution, especially by Mr. J. Townsend Russell, jr., of the scientific staff of the National Museum. These will soon be catalogued and placed on the shelves of the office library. The happy arrangement previously made with the Library of Congress to lend to the library from time to time for a brief period some of the latest popular and semipopular books was continued, much to the satisfaction of the Smithsonian employees. To the office library were added 1,938 volumes and 316 pamphlets. Its periodical entries were 835.

BUREAU OF AMERICAN ETHNOLOGY LIBRARY

The library of the Bureau of American Ethnology, which is housed in the Smithsonian Building, is one of the more important units in the library system of the Institution. It is made up, in the main, of works on anthropology, not a few of which are quite rare. It is particularly rich in publications on the archeology, history, myths, religion, arts, sociology, language, and general culture of the American Indians. The collection has some valuable manuscripts, many photographs, and several Indian vocabularies. The library numbers 29,071 volumes and 16,527 pamphlets. During the last year it was increased by 559 volumes and 150 pamphlets. The number of periodicals entered was 4,106, and the number of volumes bound 210. The additions to the card catalogue were 3,420. The loans were 840. As usual, hundreds of publications were consulted in the library, especially by members of the bureau staff, and considerable reference work was done by those in charge of the collection.

ASTROPHYSICAL OBSERVATORY LIBRARY

The library of the Astrophysical Observatory, while one of the smaller units in the library system, consists of publications of especial value in the astrophysical and meteorological work of the Institution. The main part of the collection is shelved in the Smithsonian Building, the rest in the observatory itself, where it is immediately available for the use of the investigators. Its file of current periodicals is also kept in the observatory, as is the card catalogue of the library. The collection numbers 4,008 volumes and 3,100 pamphlets. To it were added during the last year 140 volumes and 151 pamphlets. The number of volumes bound was 50.

RADIATION AND ORGANISMS LIBRARY

The library of radiation and organisms, which was established in 1929 as a major unit of the Smithsonian library system to meet the needs of a branch of research recently organized under a separate division of the Institution, made satisfactory progress during the year. An excellent working nucleus of reference books was obtained for it, and arrangements were made to receive regularly the outstanding magazines in the field of the division's special interest. A dictionary card catalogue was begun for the collection. At the end of the year the library numbered 74 volumes, 8 pamphlets, and 6 charts, besides about a hundred unbound periodicals.

LANGLEY AERONAUTICAL LIBRARY

During the year the Institution's famous collection of aeronautical publications, known as the Langley aeronautical library, was removed from the main hall of the Smithsonian Building, where it had been kept for many years, to the Library of Congress. There, with other and larger collections of its kind, it will be more centrally available to the technician and historian as well as the general student.

The collection will be under the immediate supervision of the chief of the newly organized division of aeronautics, in the development of which the Guggenheim fund has recently taken a generous interest. But it will remain a unit of the Smithsonian library system—a second deposit in the Library of Congress, distinct from the main unit of that system known as the Smithsonian deposit, but subject to the same conditions that Congress specified in providing for the establishment of the older and larger deposit. Its identity will be shown by a special stamp and book plate, and the collection will continue to bear the name of the Langley aeronautical library and will be increased from time to time by sendings from the Smithsonian—it being the desire of the Institution to preserve the collection as an independent and growing memorial to its third secretary, whose work marked the beginning of the scientific study of aeronautics in the United States.

Many of the library's rarest items once belonged to Secretary Langley; others to such well-known investigators and experimenters as Alexander Graham Bell, Octave Chanute, and James Means. The library numbers 1,734 volumes and 923 pamphlets and includes files of most of the early aeronautical magazines, together with a large number of photographs, letters, and newspaper clippings. It was increased the past year by 37 volumes, 362 parts of volumes, and 85 pamphlets.

NATIONAL GALLERY OF ART LIBRARY

When in 1920 the National Gallery of Art was set apart as a separate Government bureau under the administrative charge of the Smithsonian Institution, its library ceased to be a sectional library of the National Museum and became a major unit of the Smithsonian library system. Since that time the collection, already an important nucleus of works on fine art, both American and foreign, has grown yearly by carefully selected additions, until it now contains 1,098 volumes and 1,166 pamphlets. Small as the collection still is, it almost fills the space available for books in the present limited gallery quarters in the Natural History Building and will soon need more room there unless in the early future a special building is provided for the gallery. When that is at hand, the collection can be adequately shelved, and be permitted to grow more rapidly, to meet the expanding needs of the gallery. The library was increased during the year just closed by 97 volumes and 60 pamphlets. Most of these were purchased or received in exchange, but not a few were gifts, especially from Dr. William H. Holmes, director of the gallery. The number of periodicals entered was 271.

FREER GALLERY OF ART LIBRARY

The library of the Freer Gallery of Art is one of the most unique in the Smithsonian library system. Centering, as it does, primarily in the interest of the Freer Gallery in the arts and cultures of the Far East, India, Persia, and the nearer east, it richly supplements for the purpose of research—especially with its publications in the Chinese and Japanese languages, some of which are very rare—the corresponding collections in the Library of Congress. It also has to do somewhat with the life and works of various American painters, notably James McNeill Whistler, many of whose pictures are the possession of the gallery, and with the famous biblical manuscripts of the fourth and fifth centuries, known as the Washington Manuscripts, which the gallery is so fortunate as to own.

The main collection numbers 4,362 volumes and 2,998 pamphlets; the special collection designed for the use of the field staff of the gallery, 814 volumes and 500 pamphlets. The former was increased during the last fiscal year by 93 volumes and 229 pamphlets. The number of volumes bound was 29. During the year, thanks to the generous cooperation of the gallery, the work of reclassifying and recataloguing the library was undertaken. In this connection 1,134 cards were prepared and filed in the new dictionary catalogue. This work will be continued the coming year.

NATIONAL ZOOLOGICAL PARK LIBRARY

The library of the National Zoological Park is made up of publications that have to do chiefly with the habits and care of animals, and is designed for the use of the director and those associated with him. It numbers 1,213 volumes and 403 pamphlets. Its accessions for the year were 4 volumes and 3 pamphlets.

SUMMARY OF ACCESSIONS

The accessions for the year may be summarized as follows:

Library	Volumes	Pamphlets and charts	Total
Astrophysical Observatory.....	140	151	291
Bureau of American Ethnology.....	559	150	709
Freer Gallery of Art.....	93	229	322
Langley Aeronautical.....	37	85	122
National Gallery of Art.....	97	60	157
National Zoological Park.....	4	3	7
Radiation and Organisms.....	74	14	88
Smithsonian deposit, Library of Congress.....	2,720	4,622	7,342
Smithsonian office.....	1,938	316	2,254
United States National Museum.....	2,317	668	2,985
Total.....	7,979	6,298	14,277

The approximate number of volumes, pamphlets, and charts in the Smithsonian library system on June 30, 1930, was as follows:

Volumes.....	571,085
Pamphlets.....	186,484
Charts.....	25,261
Total.....	782,830

This total does not, of course, include the large number of volumes in the system still uncatalogued or awaiting completion.

UNION CATALOGUE

Further progress was made on the union dictionary catalogue begun a short time ago. This will require many years to complete, but when it is finished it will be an invaluable instrument in the reference activities of the Institution, for it will constitute a central authority-subject finding list, for the most part on Library of Congress cards, of all the items in all the 46 Smithsonian libraries. Unfortunately, with the present force, the progress of this work must continue to fall short each year of what we should like.

Notwithstanding this fact, however, the staff, besides keeping up with the current work, was able to finish cataloguing the important John Donnell Smith botanical collection, with the exception of one set of pamphlets and reprints, and to make considerable headway in cata-

loguing the library of the Freer Gallery of Art. This work involved classifying the publications and mounting many of them in pamphlet binders. The staff spent some time in checking the Langley aeronautical collection and making the necessary changes in the catalogue cards incident to the transfer of that library to the Library of Congress. It worked out a plan by which the Library of Congress can obtain copies of certain cards prepared by the staff for filing in its union catalogue. It also provided that Library with manuscript copies of a goodly number of titles, to be printed and distributed with the cards regularly issued by the Library. In addition, it added more than 15,000 cards to the shelf list of the Museum library, thus advancing it to a point from which it can be completed at an early date, and began the preparation of a union shelf list to be kept, with the union catalogue, in the Smithsonian Building. For this shelf list 27,417 cards were made, besides those prepared for the current publications catalogued. The cataloguing work of the year may be shown in detail by the following statistics:

Volumes catalogued.....	4,992
Volumes recatalogued.....	15
Pamphlets catalogued.....	2,622
Charts catalogued.....	289
Typed cards added to catalogue.....	8,716
Library of Congress cards added to catalogue.....	26,513

SPECIAL ACTIVITIES

Some of the special activities of the year have already been recorded under the appropriate sections of this report. Those that have not been may be set down here. One detailed piece of work was the checking of several long sets of publications, with a view to completing them, especially those of the Carnegie Institution of Washington, the Zoological Society of London, and the United States Geological Survey. In connection with this work hundreds of paper-covered publications of the United States Geological Survey were listed for return to the survey, to be replaced by cloth-bound volumes, in accordance with a recent agreement between the Museum and the survey for the exchange of bound copies of their respective publications. The reports and other publications of the State geological surveys, which had been brought together the previous year from various Smithsonian libraries, were also checked and most of them used to fill gaps in either the main library of the Museum or the library in the department of geology. The 434 volumes not needed for this purpose were given to the United States Geological Survey. About 1,050 scientific reprints were distributed to the curators.

The Wistar Institute cards were filed to date, and more than 10,000 Concilium Bibliographicum cards of the author set were filed in the main library, while the assignment, begun the year before, of appropriate parts of the systematic set to the sectional libraries was continued. It is hoped that the rest of this set can soon be deposited in the sections interested, and that in the future the new increments as they are received can immediately be sorted and sent to the curators for their files. In preparation for the forthcoming Supplement to the Union List of Serials, the staff checked the periodical records of all the Smithsonian libraries, except the deposit in the Library of Congress, for new entries and for sets completed since 1925—a task which required a great deal of time. The work of organizing the scientific duplicates in the west stacks of the main building, which had been in progress for several years, was completed to the point where most of the material became available for use. The result was that before the end of the year hundreds of publications—many of which could not otherwise have been obtained except by purchase, and then often at fancy prices—were taken from the collection and assigned to the sets in which they were lacking. The rest will soon be used in the same way, or will be sent in exchange to other libraries.

In this connection it may be reported that 93 volumes and parts of the Bulletin of the Philosophical Society of Washington were sent to the society for use in completing its three sets. About 9,600 other duplicates not needed by the libraries of the Institution were distributed to Harvard University, Yale University, Chicago University, and the Marine Biological Laboratory at Woods Hole, for similar use, under an arrangement by which the Smithsonian is to receive an equivalent exchange, not merely of old material, but in the case of at least two of the universities, of new material issued by their presses. This happy arrangement will result in placing publications not required by the Institution in strategic positions elsewhere for the furthering of research and in conserving Smithsonian funds for the purchase of publications that can not be obtained by exchange.

The popular and semipopular material that had previously been brought together in a special building behind the Astrophysical Observatory and roughly grouped was more carefully arranged, pending final disposal. The set of star charts that the Smithsonian has been receiving for some years from various important observatories was transferred as a semipermanent loan to the United States Naval Observatory, and the Institution's set of Russian meteorological bulletins was likewise transferred to the United States Weather Bureau, the purpose in each case being to place the material where it would be of most aid to investigators.

It might be added that the librarian gave 14 lectures during the year, chiefly before local groups, including the Shakespeare Society. Several of these were on the Smithsonian Institution and its library system. He also contributed a chapter on the libraries of the Institution to the history of Washington, entitled "Washington—Past and Present," which has recently appeared.

PHYSICAL CONDITION AND EQUIPMENT

About 400 feet of new steel shelving were installed in the main stack room of the Museum library. This additional space will relieve for the time being the congested condition of the library and will provide room for the rearranging of the collections that is soon to be undertaken. The improvement in physical equipment and appearance of several of the sectional libraries, notably those of botany and geology, should also be mentioned.

CONCLUSION

On the whole, the system of libraries under the Smithsonian made considerable progress during the year toward becoming a complete and available reference instrument worthy of the Institution. This progress was retarded only by the lack of sufficient funds for binding, for the purchase of many of the books and periodicals requested by the curators—publications which could not be obtained by exchange—and for the employment of enough trained workers to enable the libraries not merely to meet the daily demands upon them, but to carry forward the work of reorganization that was begun a few years ago. It is gratifying to report, however, that this condition was somewhat relieved by the generous action of the Freer Gallery of Art, already mentioned, in allotting funds for use in connection with the cataloguing of its library; and that it will soon be further relieved, for on July 1, 1930, thanks to an increase in the Government appropriation to the Smithsonian for library purposes, \$1,000 more than last year will be available for books and periodicals, and two new positions will be provided—namely, for a clerk in the exchange office of the library and a senior stenographer in the librarian's office.

But to make it possible for the system fully to meet the needs of the Institution, the annual sum for binding and for the purchase of publications should be further increased, and the staff should be further augmented by at least two cataloguers to revise the catalogue of the museum library and those of other units in the Smithsonian system, to expedite the making of the union catalogue, and to render available at the earliest possible moment the thousands of important publications still uncatalogued on the shelves; two

library assistants for service of a general nature in the sectional libraries; a library aid to relieve the more experienced assistants of minor library tasks that they are now obliged to perform in addition to their regular duties; and a stack attendant to keep the various collections in order, that publications may be found immediately when called for by the scientists. When this increased sum is at hand and these positions are provided and filled, the library system will be able to enter more worthily into the opportunity for service afforded by its close relation to the work of the Smithsonian Institution and its branches.

Respectfully submitted.

WILLIAM L. CORBIN,
Librarian.

Dr. CHARLES G. ABBOT,
Secretary, Smithsonian Institution.

APPENDIX 11

REPORT ON PUBLICATIONS

SIR: I have the honor to submit the following report on the publications of the Smithsonian Institution and the Government bureaus under its administrative charge during the year ending June 30, 1930:

The Institution proper published during the year 9 papers in the series of Smithsonian Miscellaneous Collections, 1 annual report and pamphlet copies of the 27 articles contained in the report appendix, and 1 special publication. The Bureau of American Ethnology published 5 bulletins and a list of publications of the bureau. The United States National Museum issued 1 annual report, 3 volumes of proceedings, 9 complete bulletins, 2 parts of bulletins, 1 volume and 3 parts in the series Contributions from the National Herbarium, and 32 separates from the proceedings.

Of these publications there were distributed during the year 168,163 copies, which included 71 volumes and separates of the Smithsonian Contributions to Knowledge, 19,575 volumes and separates of the Smithsonian Miscellaneous Collections, 29,886 volumes and separates of the Smithsonian annual reports, 4,598 Smithsonian special publications, 87,323 volumes and separates of the various series of the National Museum publications, 24,868 publications of the Bureau of American Ethnology, 49 publications of the National Gallery of Art, 24 volumes of the Annals of the Astrophysical Observatory, 82 reports of the Harriman Alaska Expedition, and 1,615 reports of the American Historical Association.

SMITHSONIAN MISCELLANEOUS COLLECTIONS

Of the Smithsonian Miscellaneous Collections, volume 81, 2 papers and title page and table of contents were issued; volume 82, 7 papers, making 9 papers in all, as follows:

VOLUME 81

No. 14. Prehistoric Art of the Alaskan Eskimo. By Henry B. Collins, jr. November 14, 1929. 52 pp., 24 pls., 2 text figs. (Publ. 3023.)

No. 15. Arthropods as Intermediate Hosts of Helminths. By Maurice C. Hall. September 25, 1929. 77 pp. (Publ. 3024.)

Title page and table of contents. (Publ. 3063.)

VOLUME 82

No. 1. Absorption Lines of the Infra-Red Solar Spectrum. By C. G. Abbot and H. B. Freeman. August 31, 1929. 17 pp., 5 pls., 1 text fig. (Publ. 3026.)

No. 2. The Thoracic Mechanism of a Grasshopper, and its Antecedents. By R. E. Snodgrass. December 31, 1929. 111 pp., 54 text figs. (Publ. 3027.)

No. 3. The Radiation of the Planet Earth to Space. By C. G. Abbot. November 16, 1929. 12 pp., 2 pls., 1 text fig. (Publ. 3028.)

No. 4. The Characters of the Genus *Geocapromys* Chapman. By Gerrit S. Miller, jr. December 9, 1929. 3 pp., 1 pl. (Publ. 3029.)

No. 5. Mammals Eaten by Indians, Owls, and Spaniards in the Coast Region of the Dominican Republic. By Gerrit S. Miller, jr., December 11, 1929. 16 pp. 2 pls. (Publ. 3030.)

No. 6. The Past Climate of the North Polar Region. By Edward W. Berry. April 9, 1930. 29 pp., 4 text figs. (Publ. 3061.)

No. 7. The Atmosphere and the Sun. By H. Helm Clayton. 49 pp., 33 text figs. (Publ. 3062.)

SMITHSONIAN ANNUAL REPORTS

Report for 1928.—The complete volume of the Annual Report of the Board of Regents for 1928 was received from the Public Printer in November, 1929.

Annual Report of the Board of Regents of the Smithsonian Institution showing operations, expenditures, and condition of the Institution for the year ending June 30, 1928. xii+763 pp., 145 pls., 52 text figs. (Publ. 2981.)

The appendix contained the following papers:

The Wider Aspects of Cosmogony, by J. H. Jeans.

The Stars in Action, by Alfred H. Joy.

Island Galaxies, by A. Vibert Douglas.

Astronomical Telescopes, by F. G. Pease.

New Results on Cosmic Rays, by R. A. Millikan and G. H. Cameron.

Three Centuries of Natural Philosophy, by W. F. G. Swann.

The Hypothesis of Continental Displacement, by C. Schuchert.

On Continental Fragmentation and the Geologic Bearing of the Moon's Surface Features, by Joseph Barrell.

The "Craters of the Moon" in Idaho, by H. T. Stearns.

The Oldest Known Petrified Forest, by W. Goldring.

Water Divining, by J. W. Gregory.

Some Problems of Polar Geography, by R. N. Rudmose Brown.

Birds of the Past in North America, by Alexander Wetmore.

Mammalogy and the Smithsonian Institution, by Gerrit S. Miller, jr.

The Controversy Over Human "Missing Links," by Gerrit S. Miller, jr.

What is known of the Migrations of Some of the Whalebone Whales, by Remington Kellogg.

Ecology of the Red Squirrel, by A. Brooker Klugh.

Adventures of a Naturalist in the Ceylon Jungle, by Casey A. Wood.

Communication Among Insects, by N. E. McIndoo.

Our Insect Instrumentalists and Their Musical Technique, by H. A. Allard.

The Neanderthal Phase of Man, by Aleš Hrdlička.

Indian Costumes in the United States National Museum, by H. W. Krieger.

Mounds and Other Ancient Earthworks of the United States, by David I. Bushnell, jr.

Geochronology, by Grand de Geer.

The Physiology of the Ductless Glands, by N. B. Taylor.

Arrhenius Memorial Lecture, by Sir James Walker.

Theodore William Richards, by Gregory P. Baxter.

Report for 1929.—The report of the executive committee and proceedings of the Board of Regents of the Institution and the report of the secretary, both forming parts of the annual report of the Board of Regents to Congress, were issued in December, 1929.

Report of the executive committee and proceedings of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1929. 12 pp. (Publ. 3032.)

Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1929. 144 pp., 2 text figs. (Publ. 3031.)

The general appendix to this report, which was in press at the close of the year, contains the following papers:

The Physics of the Universe, by Sir James Jeans.

Counting the Stars and some Conclusions, by Frederick H. Seares.

The Lingering Dryad, by Paul R. Heyl.

What is Light? by Arthur H. Compton.

Artificial Cold, by Gordon B. Wilkes.

Photosynthesis, by E. C. C. Baly.

Newly Discovered Chemical Elements, by N. M. Bligh.

Synthetic Perfumes, by H. Stanley Redgrove.

X Raying the Earth, by Reginald A. Daly.

Extinction and Extermination, by I. P. Tolmachoff.

The Gulf Stream and its Problems, by H. A. Marmer.

The Mystery of Life, by F. G. Donnan.

The Transition from Live to Dead: the Nature of Filtrable Viruses, by A. E. Boycott.

Heritable Variations, their Production by X rays, and their Relation to Evolution, by H. J. Muller.

Social Parasitism in Birds, by Herbert Friedmann.

How Insects Fly, by R. E. Snodgrass.

Climate and Migrations, by J. C. Curry.

Ur of the Chaldees: More Royal Tombs, by C. Leonard Woolley.

The Population of Ancient America, by H. J. Spinden.

The Aborigines of the Ancient Island of Hispaniola, by Herbert W. Krieger.

The Beginning of the Mechanical Transport Age in America, by Carl W. Mitman.

The Servant in the House; a Brief History of the Sewing Machine, by Frederick L. Lewton.

Thomas Chowder Chamberlin (1843-1928), by Bailey Willis.

Hideyo Noguchi, by Simon Flexner.

SPECIAL PUBLICATIONS

Explorations and Field Work of the Smithsonian Institution in 1929. 222 pp., 200 text figs. (Publ. 3060.)

PUBLICATIONS OF THE UNITED STATES NATIONAL MUSEUM

The editorial work of the National Museum is in the hands of Dr. Marcus Benjamin. During the year ending June 30, 1930, the Museum published 1 annual report, 3 volumes of proceedings, 9 complete bulletins, 2 parts of bulletins, 1 complete volume and 3 parts in the series Contributions from the United States National Herbarium, and 32 separates from the proceedings.

The issues of the bulletin were as follows:

Bulletin 76. Asteroidea of the North Pacific and Adjacent Waters. Part 3. Forcipulata (concluded). By Walter Kenrick Fisher.

Bulletin 100. Contributions to the Biology of the Philippine Archipelago and Adjacent Regions.

Volume 9. Bryozoa of the Philippine Region. By Ferdinand Canu and Ray S. Bassler.

Volume 10. The Fishes of the Families Amiidae, Chandidae, Duleidae, and Serranidae, Obtained by the United States Bureau of Fisheries Steamer "Albatross" in 1907 to 1910. Chiefly in the Philippine Islands and Adjacent Seas. By Henry W. Fowler and Barton A. Bean.

Bulletin 104. The Foraminifera of the Atlantic Ocean.

Part 7. Nonionidae, Camerinidae, Peneroplidae, and Alveolinellidae. By Joseph Augustine Cushman.

Bulletin 147. Archeological and Historical Investigations in Samana, Dominican Republic. By Herbert W. Krieger.

Bulletin 148. Collections of Objects of Religious Ceremonial in the United States National Museum. By Immanuel Moses Casanowicz.

Bulletin 149. Composition and Structure of Meteorites. By George P. Merrill.

Bulletin 150. Revision of the Fishes of the Family Liparidae. By Victor Burke.

Bulletin 151. East African Reptiles and Amphibians in the United States National Museum. By Arthur Loveridge.

Bulletin 152. The Cancroid Crabs of America of the Families Euryalidae, Portunidae, Ateleyclidae, Cancridae and Xanthidae. By Mary J. Rathbun.

Bulletin 153. Birds Collected by the Childs Frick Expedition to Ethiopia and Kenya Colony. Part 1. Non-Passeris. By Herbert Friedmann.

The issues of the contributions from the United States National Herbarium were as follows:

Volume 22. Systematic Plant Studies—Chiefly Tropical American.

Volume 24, Part 9. The Grasses of Central America. By A. S. Hitchcock.

Volume 26, Part 4. The Piperaceae of Costa Rica. By William Trelease.

Part 5. Notes on Certain Type Specimens of American Asteraceae in European Herbaria. By S. F. Blake.

Of the separates from the proceedings, 1 was from volume 75, 22 from volume 76, and 9 from volume 77.

PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY

The editorial work of the bureau has continued under the direction of the editor, Mr. Stanley Searles. During the year, five bulletins and a list of publications were issued, as follows:

Bulletin 88. Myths and Tales of the Southeastern Indians (Swanton). x+275 pp.

Bulletin 90. Papago Music (Densmore). xx+229 pp., 19 pls., 4 figs.

Bulletin 91. Additional Studies of the Arts, Crafts, and Customs of the Guiana Indians (Roth). xvii+110 pp., 34 pls., 90 figs.

Bulletin 93. Pawnee Music (Densmore). xvii+129 pp., 8 pls.

Bulletin 95. Contributions to Fox Ethnology.—II (Michelson). vii+183 pp., 1 fig.

List of Publications of the Bureau of American Ethnology. 50 pp.

Publications in press are as follows:

Forty-fifth Annual Report. Accompanying papers: The Salishan Tribes of the Western Plateaus (Teit, edited by Boas); Tattooing and Face and Body Painting of the Thompson Indians, British Columbia (Teit, edited by Boas); The Ethnobotany of the Thompson Indians of British Columbia (Steedman); The Osage Tribe: Rite of the Wa-xo-be (La Flesche).

Forty-sixth Annual Report. Accompanying papers: Anthropological Survey in Alaska (Hrdlička); Report to the Honorable Isaac S. Stevens, Governor of Washington Territory, on the Indian Tribes of the Upper Missouri (Denig, edited by Hewitt).

Bulletin 94. Tobacco among the Karuk Indians of California (Harrington).

Bulletin 96. Early Pueblo Ruins in the Piedra District, Southwestern Colorado (Roberts).

REPORT OF THE AMERICAN HISTORICAL ASSOCIATION

The annual reports of the American Historical Association are transmitted by the association to the Secretary of the Smithsonian Institution and are communicated by him to Congress, as provided by the act of incorporation of the association.

The annual reports for 1925 and 1926 and the supplemental volumes to these reports were issued during the year. The annual reports for 1927 and 1928 (1 volume) and for 1929 were in press at the close of the year, and also the supplemental volume to the report for 1927.

REPORT OF THE NATIONAL SOCIETY, DAUGHTERS OF THE AMERICAN REVOLUTION

The manuscript of the Thirty-second Annual Report of the National Society, Daughters of the American Revolution, was transmitted to Congress, in accordance with the law, December 9, 1929.

ALLOTMENTS FOR PRINTING

The congressional allotments for the printing of the Smithsonian Report to Congress and the various publications of the Government bureaus under the administration of the Institution were virtually used up at the close of the year. The appropriation for the coming year ending June 30, 1931, totals \$99,000, allotted as follows:

Annual report to the Congress of the Board of Regents of the Smithsonian Institution.....	\$11,500
National Museum.....	46,500
Bureau of American Ethnology.....	28,300
National Gallery of Art.....	500
International Exchanges.....	300
International Catalogue of Scientific Literature.....	100
National Zoological Park.....	300
Astrophysical Observatory.....	4,500
Annual report of the American Historical Association.....	7,000

SMITHSONIAN ADVISORY COMMITTEE ON PRINTING AND PUBLICATION

The editor has continued to serve as secretary of the Smithsonian advisory committee on printing and publication, to which are referred for consideration and recommendation all manuscripts offered to the Institution and its branches. The committee also considers matters of publication policy. Five meetings were held during the year and 70 manuscripts acted upon. The membership at the close of the year was as follows: Dr. Leonhard Stejneger, head curator of biology, National Museum, chairman; Dr. William M. Mann, director, National Zoological Park; Mr. M. W. Stirling, chief, Bureau of American Ethnology; Dr. R. S. Bassler, head curator of geology, National Museum; Mr. W. P. True, editor of the Institution, secretary; Dr. Marcus Benjamin, editor of the National Museum; and Mr. Stanley Searles, editor of the Bureau of American Ethnology.

Respectfully submitted.

W. P. TRUE, *Editor.*

DR. CHARLES G. ABBOT,
Secretary, Smithsonian Institution.

APPENDIX 12

LIST OF SUBSCRIBERS TO THE JAMES SMITHSON MEMORIAL EDITION, SMITHSONIAN SCIENTIFIC SERIES, SINCE NOVEMBER 15, 1929¹

Mr. Frank C. Ball, Muncie, Ind.	Mrs. Amelia L. Lashar, Fairfield, Conn.
Mrs. John N. Carey, Indianapolis, Ind.	Mr. C. R. Morley, Cleveland, Ohio.
Mr. Frederic G. Carnochan, New York City.	Dr. Fred T. Murphy, Detroit, Mich.
Mr. M. Friedsam, New York City.	Mr. Philip M. Plant, New York City.
Mr. John Gellatly, New York City.	Mr. Charles L. Riker, New York City.
Mr. William Hale Harkness, New York City.	Mrs. Mary E. Sage, West Hartford, Conn.
Mrs. William L. Harkness, New York City.	Countess László Széchenyi, Washington, D. C.
Mrs. Edward Henry Harriman, New York City.	Mr. W. H. Truesdale, New York City.
Mr. T. A. Havemeyer, New York City.	Mr. Charles B. Van Duzen, Detroit, Mich.
Mr. Franklyn L. Hutton, New York City.	

¹ For full list of subscribers see report of the Secretary of the Smithsonian Institution for the year ending June 30, 1929.

SMITHSONIAN INSTITUTION LIBRARIES



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